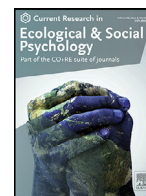




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Trust as a daily defense against collective disease threats

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ABSTRACT

Although the isolated threat of disease often motivates people to avoid others, people need the help and cooperation of others to protect themselves against pandemic disease threats. Therefore, the fear of contracting a highly contagious virus like COVID-19 should motivate people to believe that they can in fact count on the help and cooperation of others for protection. Trusting in others provides the basis to anticipate their cooperation. Therefore, we expected a greater daily threat of contracting COVID-19 to motivate people to trust *more* in others, providing needed assurance that others would keep them safe from harm. We obtained 4 daily diary samples involving 2794 participants who provided in excess of 18,000 daily observations within the first three months of the COVID-19 pandemic. Each day, we tracked (1) disease threat, captured daily by personal concerns about COVID-19 and infection totals in the nearest most populous city, and (2) trust in others, captured daily by expressions of trust in intimates, collective caregivers (e.g., President, Congress), and strangers. Participants in two samples completed 2-month follow-ups. Integrative analyses of the daily diaries revealed that people trusted *more* in intimates and collective caregivers on days they had *greater* (vs. less) reason to be concerned about COVID-19. Further integrative analyses of the follow-up data revealed that participants who were initially *more* likely to trust in others on days when COVID-19 cases in nearby communities spread more rapidly later reported greater confidence that others would keep them safe from harm. That is, they evidenced greater physical, interpersonal, and collective security in social connection than participants who were initially *less* likely to defensively trust in others on such occasions. The present findings suggest that ecological threats may dynamically motivate people to trust others more than they otherwise would, providing optimism that collectively-faced crises may motivate social cooperation when it is most needed.

1. Introduction

People can be hurt by the connections they share with others (Kenrick et al., 2010; Murray et al., 2006). Normally-tolerant spouses may launch tirades, good friends may ignore or even ghost texts, neighbors may refuse to vaccinate their children against highly infectious illnesses, and the federal government may mishandle public health crises. In such situations, it would seem entirely rational and prudent for people to be wary and distrustful of others.

In exceptionally difficult times, though, people need to rely and depend on others to survive and thrive, both physically and psychologically (Baumeister and Leary, 1995; Kenrick et al., 2010). Given the adaptive importance of being able to count on the cooperation of others (Holt-Lundstadt et al., 2010; Robles et al., 2014; Van Lange and Rand, 2022), people should be especially motivated to trust others when

they are particularly vulnerable and dependent on them (Koranyi et al., 2015; Tooby and Cosmides, 1996). Indeed, people primed with being rejected or isolated from close others perceive *more* trustworthy features in the faces of new acquaintances (Dewall et al., 2009; Koranyi and Rothermund, 2012; Young et al., 2015) and perceive potential friends as physically closer in space (Pitts et al., 2014). Automatic perceptual biases such as these should make it easier to trust in the cooperativeness and goodwill of others in crises, strengthening social connection when people most need it.

Nevertheless, research on the behavioral-immune system suggests that the fear of contracting an infectious illness typically motivates people to be vigilant, wary, and suspicious of others (Miller and Maner, 2012; Mortensen et al., 2010; Navarette and Fessler, 2006; Oaten et al., 2009; Sacco et al., 2014; Tybur and Lieberman, 2016). For instance, people primed with infectious disease report being less

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gregarious and more socially discriminating, as compared to controls (Sacco et al., 2014). They also pull away from unfamiliar faces (Mortensen et al., 2010), forego new romantic suitors (Sawada et al., 2018), and distrust outgroups (Navarrete and Fessler, 2006). Consistent with these findings, the initial months of the COVID-19 pandemic put the motivation to sustain trust in others during a crisis to an unprecedented “stress-test”. Specifically, the onset of the pandemic forced people to face the possibility of contracting a life-threatening virus from virtually anyone they met (Bai et al., 2020; Qian et al., 2020). It also created a general state of fear and anxiety (Pedrosa et al., 2020), put untold stress on families (Bar-Kalifa et al., 2021; Leonard et al., 2022; Pietromonaco and Overall, 2021; Prime et al., 2020) and gave people reason to question the competence of their government (Bodas and Peleg, 2021; Devine et al., 2021) and the wisdom of those who believed (or disbelieved) rampant conspiracy theories (Douglas, 2021).

At the same time, however, the onset of the pandemic also made it all the more important for people to trust in others to feel secure in social connection. Rather than being limited to a singular source of stress that individuals or families might manage on their own, the initial months of the pandemic introduced multiple sources of stress that individuals and families could not manage on their own, compounding the threat of illness with social isolation, impossible household demands (e.g., homeschooling), empty grocery store shelves, and great employment and economic uncertainty (Sibley et al., 2020). Rather than being easily identifiable in others, the virus could also be spread by people showing no signs of infection (Bai et al., 2020), making it impossible for any individual to know who to avoid in any given situation.

Thus, the onset of the pandemic, suddenly and abruptly, thrust people into a newly collective interdependent reality – one where they had limited individual power to protect themselves or their loved ones against COVID-19 (Schraff, 2020). Indeed, in the initial months of the pandemic, this new interdependent reality was reinforced through public messaging. This messaging repeatedly emphasized that curtailing the spread of COVID-19 and limiting its economic and societal toll depended on governments enforcing, and the public collectively complying with, protective measures like quarantining, social-distancing and mask-wearing (Bargain and Aminjonov, 2020; Eikenberry et al., 2020; Han et al., 2021; Lyu and Wehby, 2020; Narvarro-Carrillo et al., 2018; Qian et al., 2020; Wilder-Smith and Freedman, 2020).

1.1. The pressure to trust more in others in the face of collective disease threats

In the face of such a need for collective cooperative action, we reasoned that people would be motivated to trust others *more*, rather than less, on occasions when the disease threat COVID-19 posed to them grew more imminent. Specifically, we hypothesized that people would be motivated to trust *more* in others on days when they had *greater* reason to be personally concerned about the disease threat posed by COVID-19, as compared to days when they had *less* reason to be personally concerned. On such days, defensively perceiving others as *more* trustworthy should provide needed assurance that others will behave cooperatively to contain the threat posed by COVID-19 (Van Bavel et al., 2020; Van Lange, 2015; Van Lange and Rand, 2022). Therefore, on such threatening occasions, people should selectively search for evidence that would allow them to believe they could truly trust the individuals and entities who had the greatest control over their vulnerability to COVID-19 – namely, the friends and family members they interacted with daily (Qian et al., 2020; Wilder-Smith and Freedman, 2020), the government leaders they had to rely on to care for the nation’s welfare (Bargain and Aminjonov, 2020; Eikenberry et al., 2020; Han et al., 2021; Lyu and Wehby, 2020; Narvarro-Carrillo et al., 2018; Wilder-Smith and Freedman, 2020), and the strangers they might encounter in routine interactions.

Indeed, preliminary evidence from the initial weeks of the pandemic revealed national increases in collective trust (Devine et al., 2021). For

instance, residents of New Zealand surveyed during the first lockdown imposed in March 2020 reported significantly greater trust in science, politicians, and the police than New Zealanders surveyed in the fall of 2019 (Sibley et al., 2020). Residents of the Netherlands also reported significantly greater trust in the government and trust in science after the imposition of lockdown measures than before (Groeniger et al., 2021). Similarly, residents of Israel reported significantly greater trust in the Ministry of Health in March 2020, after COVID-19 reached Israel, than they did in February 2020, though such bolstered trust eroded over time (Bodas and Peleg, 2021).

However, comparing group level reports of trust at different points in the pandemic is open to numerous historical artifacts, which makes it difficult to know whether concern about COVID-19 per se is responsible for such shifts. The diary data we obtained allowed us to examine whether trust varied dynamically with *daily* changes in the threat COVID-19 posed.

Specifically, we expected participants to trust *more* in intimates, the public health officials, political leaders and government institutions charged with the nation’s care, and perhaps even strangers on days when they had *greater* reason to be concerned about the disease threat COVID-19 posed to them, as compared to days they had *less* reason to be concerned. Consistent with this logic, people often defend against daily anxieties about being let down or hurt in specific relationships by *substituting* one reason to trust in the security of social connection for another (Feeney and Collins, 2015; Plusnin et al., 2018). For instance, on days when people have *greater* reason to question the trustworthiness of a family member, they perceive their political leaders as having especially wise judgment (Murray et al., 2021). Conversely, on days when people have greater reason to question the trustworthiness of political leaders or fellow citizens, they perceive their family members as having especially positive motivations (Murray et al., 2021, 2021).

1.2. The adaptiveness of trusting more in others in the face of collective disease threats

People differ in how readily they can reassure themselves in the face of threats (Jonas et al., 2014). For instance, when the threat of contracting a contagious disease is salient, people who generally feel *less* vulnerable to infectious diseases perceive highly attractive potential romantic partners as enticing rather than threatening, reassuring themselves that strangers are not to be feared (Sawada et al., 2018). Similarly, when the threat of being hurt by a romantic partner is salient, people who generally feel secure in relationships perceive transgressions as excusable rather intentional, reassuring themselves their partner is not to be feared (Murray and Holmes, 2017). Therefore, we reasoned that people would also differ in how readily they could reassure themselves of the trustworthiness of others on days when COVID-19 posed a greater threat to them (Kunda, 1990). And we further reasoned that those people who were *more* likely to reassure themselves of the trustworthiness of others on days they had greater reason to fear COVID-19 would *later* feel safer and more secure in social connection, as compared to people who were less likely to reassure themselves in this way.

Why would this be the case? The personal capacity to continue believing that it is safe to trust and depend on intimates, neighbors, political leaders, and government institutions is the glue that holds families, communities, and nations together (Anderson, 2010; Hamm et al., 2019; Helliwell, 2006; Holt-Lundstadt, 2018; Hudson, 2006; Irwin, 2009; Spadaro et al., 2020; Tov and Diener, 2008; Van Lange, 2015; Ward and Meyer, 2009). Indeed, people turn to the security that collective relationships afford in times of societal strife (Tooby and Cosmides, 1996). For instance, being *more* collectivistic, and trusting of others, protects people against physical health threats (Morand and Walther, 2018) and economic threats (Bianchi, 2016). Therefore, we expected people’s personal capacity to trust *more* in others when they had greater daily reason to be concerned about COVID-19 to provide them with daily reassurance that they really could count on others to protect them from harm.

Consequently, relative to people who were less likely to reassure themselves, we expected people who were *more* likely to reassure themselves to later feel physically, interpersonally, and collectively safer in social connection.

1.3. Overview and hypotheses

This paper presents tests the novel hypotheses that (1) people are *more* likely to trust in others on days they are *more* (vs. less) personally concerned about COVID-19, and (2) people who are *more* (vs. less) personally likely to increase their trust in others when they are *more* concerned about COVID-19 would *later* feel physically, psychologically, and collectively safer and more secure in social connection. Trust promotes greater willingness to cooperate and comply with public health recommendations (Bodas and Peleg, 2021; Bargain and Aminjonov, 2020). Therefore, understanding how trust changes dynamically in the face of waning/waxing concerns about COVID-19 may be crucial in tuning public health guidance to its audience.

To test the hypotheses, we obtained four samples of participants completing 7–10 daily diaries from the United States (4/4 samples) and United Kingdom (1/4 samples) between April and June 2020, which corresponded to the initial months into the COVID-19 pandemic in both countries. At this point in the pandemic, conservative governments were leading the U.S. (Republicans under Donald Trump) and U.K. (Conservatives under Boris Johnson), scientists in both countries were still debating the primary means of COVID-19 transmission, lockdowns had been imposed, though more stringently in the U.K. than the U.S. (where lockdown policies varied state to state), and both U.S. and U.K. federal governments were scrambling to contain the pandemic. Indeed, Boris Johnson contracted COVID-19 during the first 10 days of U.K. data collection. Two to three months after the diary studies were complete, we asked Samples 1 and 4 participants to complete follow-up surveys. Participants in all samples otherwise completed nearly identical measures. This allowed us to combine the four daily diary samples in an integrated daily diary data set with 2794 participants and 18,661 observations. It also allowed us to combine the two follow-up samples to create an integrated follow-up data set with 865 participants. Relative to analyzing studies individually, combining data sets into one affords increased statistical power and tests of generalizability of the obtained effects across each of the samples (Curran and Hassan, 2009).¹

The daily diary data afforded *within-person* hypothesis tests; these data allowed us to examine whether people are *more* likely to trust others on days when they have *greater* reason to be concerned about COVID-19, as compared to days when they have *less* reason to be concerned. Self-reported concerns about contracting specific diseases often misestimate objective risk (Avis et al., 1989; Lek and Bishop, 1995). Therefore, we indexed the daily *independent variable* – daily reason to be concerned about COVID-19 – through (1) personally reported (perceived) concerns and (2) COVID-19 cases in the nearest most populous city. We indexed the daily *dependent variable* – trust in others – through (1) trust in *intimates*, such as a spouse, friend, or parent, (2) trust in the *collective caregivers* tending to societal welfare, such as a President or Prime Minister, Congress or House of Commons, and public health officials, and (3) trust in *community members*, such as random passersby on the street.

The two-month follow-ups afforded *between-person* hypothesis tests; these data allowed us to examine whether people who are *more* likely to reassure themselves of the trustworthiness of others on days when COVID-19 posed a *greater* threat to them *subsequently* felt safer and more secure in social connection, as compared to people who were *less* likely to reassure themselves in this way. We indexed (1) increased *physical safety and security* through decreased worry about the physical

health of oneself, friends and family, and strangers, (2) increased *interpersonal safety and security* through increased attachment security, decreased attachment insecurity, and increased trust in romantic partners, and (3) increased *collective safety and security* through increased trust in human goodwill, decreased fear-based xenophobia, and decreased susceptibility to the conspiracist belief that all-powerful cabals were secretly working together to harm or control the citizenry for nefarious ends.

We generally expected people who were *more* likely to *more* likely to reassure themselves of the trustworthiness of others when COVID-19 posed a greater daily threat to them to subsequently feel *more* physically, interpersonally, and collectively secure in social connection two months further into the pandemic. However, focusing conscious attention on automatic or motivated processes can lessen the security they afford (Hicks et al., 2020; Murray et al., 2008). This suggests that people may be *more* likely to benefit from reassuring themselves of the trustworthiness of others when they are *less* consciously attuned to the daily threat that likely elicited such trusting perceptions than when they are *more* consciously attuned to this threat. Presumably, people are *less* consciously attuned to the number of COVID-19 infections in the nearest most populous city than the contents of their own daily thoughts (Avis et al., 1989; Lek and Bishop, 1995). Therefore, we speculated that participants defensively trusting more in others in the face of the subtle or background disease threat posed by spreading COVID-19 infections might be more effective in fostering later security in social connection because participants might be *less* likely to second-guess such motivated perceptions.

2. Method

This research was approved by the (blinded) Institutional Review Board and participants provided informed consent. We based the sample sizes of the funded studies on Monte Carlo power simulations to detect 2-way cross-level interactions (Mathieu et al., 2012), using input parameters derived from tests of related questions in our prior diary research. These simulations suggested power to detect 2-way interactions should approximate 0.90. We discuss the four samples in parallel, focusing on the common measures. We discuss procedures and measures not relevant to the current investigation in the Supplementary Online Materials (SOM). The measures were identical across samples unless noted. Although the studies were not pre-registered, the data are available on OSF (https://osf.io/ubzx9/?view_only=e4e3da7667f8475b8316f1c7cd479b28). Data from one or more of the current samples were used in two published and two submitted manuscripts (see SOM).

2.1. Participants

Sample 1. Using the online platform Prolific Academic, we recruited 500 paid participants (250 U.S.; 250 U.K.) for a 10-day study, expecting 350 to complete 8/10 assessments. Participants had to be in monogamous, heterosexual live-in romantic relationships, U.S. or U.K. residents, native English speakers, and pass a research integrity check. Ultimately, 478 participants finished 9/10 assessments on average; 76% completed all 10. Participants (164 men) averaged 36.3 years in age ($SD=11.5$); relationships averaged 11.0 ($SD=10.4$) years in length (152 dating, 44 engaged, 281 married); 255 had 1.9 children ($SD=0.9$). Of the 344 employed participants, 36% were prioritized to work in person. U.S. participants lived across 41 states, with most from Florida (9%), Illinois (6.4%), New York (7.3%), North Carolina (5.6%), Ohio (6.4%), and Texas (6.4%); U.K. participants resided in England (87.3%), Scotland (7.8%), Wales (3.3%), and Northern Ireland (1.6%). The majority of the sample (87.7%) identified as White (4% Asian, 0.2% Middle Eastern, 3.3% Black, 1.7% Latino/Latina, 2.5% mixed race). Participants described themselves as being at roughly the middle rung ($M = 5.29$, $SE=1.55$) on the MacArthur scale of subjective social status

¹ Focal variables within each individual sample were transformed into z-scores before the four samples were combined into one data set (that also included a study identifier).

(Adler et al., 2000). Participants provided daily reports April 6–15, 2020. Participants who completed all 10 surveys were paid \$22 U.S. (with payment prorated for participants completing fewer assessments).

Sample 2. Using the online platform ResearchMatch, we solicited 1884 participants to attempt the first assessment of an 8-day study (for a chance to win 1/100 \$10 Amazon gift cards). To be eligible, participants had to be U.S. residents, native English speakers, and pass a research integrity check. We oversampled, expecting greater attrition and missing data in a volunteer sample and decided a-priori to drop participants who completed only the first, background assessment, leaving a total sample of 1546. These participants finished 5.7/7 of the remaining daily assessments on average; 51% completed all 7. They (275 men) averaged 45.3 years in age ($SD=17.1$); 469 were single and 1049 were in romantic relationships averaging 15.0 ($SD=14.9$) years in length (56 casually dating, 292 exclusively dating, 57 engaged, 644 married); 673 had 2.2 children ($SD=1.1$). Of the 904 employed participants, 37% were prioritized to work in person. Participants lived across 49 states, concentrated in Oklahoma (9.8%), North Carolina (9%) and California (5%). The majority (84.5%) identified as White (4% Asian, 0.5% Middle Eastern, 4.5% Black, 2.3% Latino/Latina, 0.5% Indigenous, 3.0% mixed race). Participants described themselves as being just above the middle rung ($M = 5.78$, $SE=1.71$) on the MacArthur scale of subjective social status. They provided daily reports between April and May 2020.

Sample 3. We recruited 215 Psychology 101 undergraduates for a 10-day study for course credit in April–May 2020. We enrolled as many participants as we could before the semester ended. Participants had to pass a research integrity check. Participants finished 5/9 daily assessments on average; 18% completed all 9. Participants (120 men) averaged 19.1 years in age ($SD=1.6$); 135 participants were single and 80 were in romantic relationships averaging 1.3 ($SD=1.4$) years in length (22 casually dating, 57 exclusively dating, 1 engaged). Less than half (39.1%) identified as White (29.8% Asian, 3.3% Middle Eastern, 11.2% Black, 10.2% Latino/Latina, 5.6% mixed race). Participants described themselves as being at roughly the middle rung ($M = 5.43$, $SE=1.63$) on the MacArthur scale of subjective social status.

Sample 4. We contracted the survey software and participant recruitment company Qualtrics to recruit at least 400 participants, which it exceeded given oversampling to guarantee the targeted sample size, soliciting 716 participants to attempt the first assessment. Eligible participants had to be U.S. citizens in monogamous, heterosexual live-in romantic relationships, native English speakers, and pass a research integrity check. Qualtrics did not recontact participants who only completed the first, background assessment, leaving 550 participants completing 9.6/11 assessments on average (with 348 completing all 11). Participants (268 men) averaged 42.6 years old ($SD=11.7$) and 363 had 2.1 children ($SD=1.1$). Relationships averaged 13.3 ($SD=10.2$) years in length (130 dating, 36 engaged, 389 married). Of the 392 employed participants, 25.3% were prioritized to work in person. Participants lived across 41 states, with most from California (15.3%), North Carolina (11.9%), Indiana (10.5%), Vermont (5.9%), and Hawaii (5.4%). Less than half (43.4%) identified as White (16.8% Asian, 0.3% Middle Eastern, 18.6% Black, 15.1% Latino/Latina, 0.4% Indigenous, 4.5% mixed race). Participants described themselves as being at roughly the middle rung ($M = 5.64$, $SE=1.47$) on the MacArthur scale of subjective social status. The majority (65.7%) described their household income as between \$50,000 and 149,999 a year). They were recruited in two 3-week cohorts in May and June 2020.

2.2. Procedure

Each sample participated online (see SOM). On the first assessment day, participants completed background surveys containing demographic and personality measures assessed once. Subsequent daily surveys were emailed to participants at 6 PM local time for the next 9 consecutive days in Samples 1, 3 and 7 consecutive days in Sample 2. In Sample 4, subsequent daily surveys were emailed to participants at

5 PM local time every other day for the next 3 weeks, resulting in 10 bidaily assessments. Participants had until a specified (local) time the next morning (6–7 A.M.) to complete the survey in each study. Samples 1–3 were nonexperimental; Sample 4 participants were randomly assigned to one of two experimental conditions (see SOM) that did not significantly moderate the effects. Sample 1 and 4 participants were contacted two months after the daily component to participate in a short online follow-up, yielding a response rate of 90% in Sample 1 ($N = 428$) and 79% in Sample 4 ($N = 437$).

2.3. Assessing the likelihood of trusting in the face of daily disease threat in samples 1–4

Daily perceived disease threat. In Samples 1–3, participants rated their concern about “the spread of illness” and “COVID-19/Coronavirus” each day, 0=*not at all concerned*, 4=*extremely concerned*; we averaged these items to index daily perceptions of the disease threat posed by COVID-19. In Sample 4, participants only rated their concern about “COVID-19/Coronavirus” each day, 0=*not at all concerned*, 4=*extremely concerned*.

Daily actual disease threat. For the U.S. participants in Samples 1–4, we obtained the cumulative total number of COVID-19 infections reported on each assessment day in the 10 most populous U.S. cities (i.e., Chicago, Dallas, Houston, Los Angeles, NYC, Philadelphia, Phoenix, San Antonio, San Diego, San Jose) from public websites (see SOM). We then used each participant’s zip code and Google Maps to identify the number of COVID-19 infections in the most populous city geographically closest to each participant on each assessment day. For the U.K. sample, we obtained the cumulative total number of COVID-19 infections reported in each of the top 16 U.K. counties (e.g., Birmingham, Cumbria, Essex, Surrey) on each of the 9 daily assessment days from <https://news.sky.com/story/coronavirus-uk-tracker-how-many-infections-are-in-your-area-updated-daily-11,956,258>. We then used each participant’s county code and Google Maps to identify (1) the number of COVID-19 infections in the most populous county geographically closest to each participant on each assessment day.²

Daily trust in intimates. Contemporary models of interdependence, such as the risk-regulation (Murray et al., 2000, 2006) and motivation-management models (Murray and Holmes, 2009) equate trust with positive perceived regard (i.e., perceptions of an intimate’s caring, love, and support, Simpson, 2007). Therefore, in Samples 1–3, we captured daily trust by averaging participants’ ratings of how supported/loved they felt by their (1) romantic partner, (2) children, if applicable, (3) parents, if applicable, and (4) friends, each day, 0=*not at all supported/loved*, 6=*very supported/loved*. In Sample 4, participants also directly rated how much trust/confidence they had in their (1) spouse/romantic partner, (2) children, if applicable, and (3) friends each day, 0=*no trust at all*, 4 = *a great deal*, in addition to rating how supported/loved they felt by each, 0=*not at all supported/loved*, 6=*very supported/loved*. In Sample 4, we created a

² At the time of data collection, it was not possible to obtain reliable case counts for exact city/town/county participants lived in because these data were either not being collected or not being publicized. However, the number of cases in the most populous cities in the U.S. and counties in the U.K. were being reliably tracked and widely publicized. Therefore, we used the cases in the nearest most populous city in the U.S./county in the U.K. to capture the objective daily disease threat posed by COVID-19 because we expected participants to be exposed to these case counts through the news, social media, and/or social osmosis. We utilized the cumulative number of cases each day to index daily disease threat rather than the absolute change in cases from one day to the next. We did so because the cumulative number of cases better captures the more or less rapid spread of COVID-19 in the population, and thus, greater or lesser reason to be concerned about encountering infected individuals on any given day. In contrast, the absolute change in cases psychologically obscures how quickly the virus is spreading in the population because the absolute change in cases ignores the base rate of infection.

composite index of trust in intimates by z-scoring and averaging these two measures of trust, $r = 0.54$.

Daily trust in collective caregivers. In Samples 1–3, we indexed daily trust in collective caregivers by averaging how much trust/confidence participants reported in 10 entities each day, using U.S./U.K. nomenclature as needed (i.e., “The President/The Prime Minister”, “The United States Congress/The House of Commons”, “local/state government/local borough council”, “The Centers for Disease Control/Department of Health and Social Care”, “The White House Coronavirus Task Force/National Health Service”, “the legal system”, “the police force”, “your church or religious institution”, “medical professionals”, and the “World Health Organization”, 0 = *no trust at all*, 4 = *a great deal*). In Sample 4, we averaged participants’ trust/confidence in 14 entities each day (i.e., “The President”, “The United States Congress”, “the efficacy of social distancing”, “the legal system”, “the police force”, “the church”, “White House Coronavirus Task Force”, “doctors/nurses”, “The Centers for Disease Control”, “Dr. Anthony Fauci, The Director of the National Institute of Allergies and Infectious Disease”, “my state governor”, “public health officials”, “The U.S. population/my fellow citizens,” and “epidemiologists”).³

Daily trust in strangers. We serially presented 8 headshots of strangers (varying daily), and for each image, participants in Samples 1–3 indicated the extent to which they would be “willing to meet or interact (e.g., talk to) the person pictured” and Sample 4 participants rated how much they would trust the person pictured “right from the start”, 0 = *not at all*, 8 = *very much so*. We selected the headshots from the Chicago Face Database (CFD, Ma et al., 2015), constraining the 8 images presented each day so that participants saw new male and female faces representing four races (i.e., Black, White, Asian, Latino), with the images roughly matched in age, attractiveness, threateningness, trustworthiness, and unusualness. We indexed trust in strangers each day by averaging responses to the 8 new images of strangers presented each day.

2.4. Assessing the adaptiveness of trusting in the face of daily disease threat in samples 1 and 4

2.4.1. Physical safety/security of social connection

In each daily assessment, participants reported how worried they were about their (1) own physical health, (2) the physical health of (a) immediate family and (b) friends, and (3) the physical health of strangers, 0 = *not at all worried*, 4 = *very worried*. To capture the physical security of social connection at Time 1, we averaged daily worries for each target. At the 2-month follow-up, participants reported how worried they were about their (1) own physical health, (2) the physical health of (a) immediate family and (b) friends, and (3) the physical health of strangers “these days”, 0 = *not at all*, 4 = *very worried*.

2.4.2. Interpersonal safety/security of social connection

Participants completed measures of attachment style and romantic trust to capture the experience of security in interpersonal relationships on the first assessment day and again at the 2-month follow-up.

Attachment. Participants completed the 14-item measure of attachment qualities (Carver, 1997) to capture security (e.g., “It feels relaxing and good to be close to someone”, avoidance (“I prefer not to be too close to others”), ambivalence-worry (“I often worry that my partner does not really love me”) and ambivalence-merger (“I have trouble getting others to be as close as I want them to be”), 1 = *I disagree with this statement a lot*, 4 = *I agree with this statement a lot*. We averaged the avoidance, ambivalence-worry, and ambivalence merger scales at each time point to create an index of attachment insecurity at Times 1 and 2.

³ We omitted “banks/financial markets”, “science/scientists”, and the “media/press” from the composite because these entities are not directly responsible for the care of others.

Trust in romantic partner. Participants completed 3-items to capture their trust in their romantic partner (i.e., “I can trust my romantic partner completely”, “I can always count on my romantic partner to be responsive to my needs”, “My romantic partner is always there for me”, Murray et al., 2021, 0 = *do not agree at all*, 8 = *agree completely*).

2.4.3. Collective safety/security of social connection

Participants completed measures of trust in others, conspiratorial thinking, and fear-based xenophobia, to capture the experience of security in collective relationships on the first assessment day and again at 2-months.

Trust in human goodwill. Participants completed the 3-item Pew Research Center dichotomous scale (i.e., “Generally speaking, would you say that most people can be trusted or that you can not be too careful in dealing with people?”; “Would you say that most of the time, people try to be helpful, or that they are mostly just out for themselves?”; “Do you think that most people would try to take advantage of you if they got the chance or would they try to be fair?”). Reporting people can be trusted, try to be helpful, and try to be fair captures greater trust.

Belief in conspiracy theories. Participants completed only 9-items from the Brotherton et al. (2013) Generic Conspiracists Belief Scale (e.g., “The power held by heads of state is second to that of small, unknown groups who really control world politics”, “The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of some organization”, “Certain significant events have been the results of the activity of a small group who secretly manipulate world events”) to capture distrust of individuals and entities charged with caring for the collective, –2 = *definitely not true*, 2 = *definitely true*.

Fear-based xenophobia. Participants only completed 6 items from the fear-based xenophobia scale (e.g., “Immigrants can cause increases in crimes”, “Interacting with immigrants can make me uneasy”) to capture distrust of strangers and unfamiliar others, Van der Veer et al. (2011), 1 = *strongly disagree*, 6 = *strongly agree*.

3. Results

We first present the analyses examining whether participants, on average, reported greater trust in others on *days* when they had greater reason to be concerned about the disease-threat posed by COVID-19, as compared to *days* they had less reason to be concerned. We then present the analyses examining whether *individuals* who are *more* likely to trust in others on days when they have greater reason to be concerned about COVID-19 perceive social connection to be physically, interpersonally, and collectively safer and more secure two months later.

3.1. Daily level processes: the likelihood of trusting in the face of daily disease threat

Table 1 contains the descriptive information for the daily measures in each sample, including internal consistencies. Table 2 contains the intercorrelations among the primary variables used in the daily level analyses.

We modeled the data as a two-level nested structure using the multilevel modeling program MLwiN (Goldstein et al., 1998) with day/assessment number (i.e., time) at Level 1 and participant at Level 2. We predicted the current day’s trust outcome (i.e., daily trust in intimates, collective caregivers, or strangers) from the main effects of (1) the current day’s perceived disease threat (i.e., self-reported concern about COVID-19), which was within-person centered on the participant’s daily mean and (2) the current day’s actual disease threat (i.e., the cumulative number of COVID-19 cases in the most populous city geographically closest to the participant), which was also within-person variable centered on the participant’s daily mean. Both these variables were allowed to vary randomly across participants. We included the main effects of participants’ mean perceived and actual disease threat to ensure the daily-level effects were not confounded with between-person effects

Table 1
Descriptive information about the daily measures in Samples 1–4.

Variable	Sample 1 (Prolific Academic)		Sample 2 (Research Match)		Sample 3 (Undergrads)		Sample 4 (Qualtrics)	
	Mean (SD)	α	Mean (SD)	α	Mean (SD)	α	Mean (SD)	α
Daily COVID-19 concern	2.63 (1.16)	.90	2.29 (1.17)	.91	2.45 (1.18)	.86	2.48 (1.25)	–
Daily cases in most populous city closest to the participant	UK:1291(318) US:17,987 (32,211)	–	27,245 (44,919)	–	131,480 (33,842)	–	56,459 (66,993)	–
Daily trust in intimates	4.09 (1.28)	.70	4.07 (1.41)	.71	4.08 (1.33)	.68	0.00 (0.88)	.70
Daily trust in collective caregivers	2.10 (0.72)	.82	2.03 (0.60)	.74	2.00 (0.83)	.89	2.05 (0.71)	.86
Daily trust in strangers	3.69 (2.12)	.97	4.57 (2.16)	.98	3.27 (2.21)	.98	3.87 (1.68)	.94

Table 2
Intercorrelations among the primary variables used in the integrative daily multi-level analyses.

Variable	1	2	3	4	5
1. Daily self-reported COVID-19 concern	–	.03	.10	.15	.01
2. Daily cumulative COVID-19 cases	–0.06	–	.01	–0.03	–0.03
3. Daily trust in intimates	.02	.01	–	.27	.17
4. Daily trust in collective caregivers	.08	–0.06	.11	–	.20
5. Daily trust in strangers	.02	–0.01	.05	.05	–

Note: Intercorrelations among the daily within-person (centered) variables are below the diagonal and intercorrelations among the daily between-person means are above the diagonal.

Table 3
Integrative analysis predicting today’s trust in personal connections and trust in collective caregivers from today’s perceived (i.e., concern about COVID-19) and actual (i.e., cumulative cases in closest most populous city) disease threat.

Predictor	Daily Trust in Intimates				Daily Trust in Collective Caregivers			
	b (SE)	z	p	95%CI	b (SE)	z	p	95%CI
Intercept	–0.0008 (0.0251)	–	–	–	.0306 (0.0258)	–	–	–
Prior day’s outcome variable	–0.0286 (0.0088)	–3.25	.001	–0.046, –0.011	.0429 (0.0081)	5.30	<0.0001	.027, 0.059
Today’s perceived disease threat	.0343 (0.0133)	2.58	.001	.008, 0.060	.0404 (0.0092)	4.39	<0.0001	.022, 0.058
Today’s actual disease threat	–0.0444 (0.0848)	–0.52	.603	–0.211, 0.122	.1456 (0.0537)	2.71	.007	.040, 0.251
Average perceived disease threat	.1003 (0.0192)	5.22	<0.0001	.063, 0.138	.1496 (0.0204)	7.33	<0.0001	.110, 0.190
Average actual disease threat	.0033 (0.0176)	0.19	.849	–0.031, 0.038	–0.0309 (0.0184)	–1.68	.0937	–0.067, 0.005
Time	.0020 (0.0027)	0.74	.459	–0.003, 0.007	–0.0203 (0.0016)	–12.7	<0.0001	–0.023, –0.017
Study (Research Match vs. Prolific)	.0035 (0.0478)	0.07	.944	–0.090, 0.097	.0460 (0.0504)	0.91	.363	–0.053, 0.145
Study (Research Match vs. Qualtrics)	–0.0158 (0.0450)	–0.35	.726	–0.104, 0.072	.0411 (0.0482)	0.85	.395	–0.053, 0.136
Study (Research Match vs. Undergrad)	–0.0168 (0.0702)	–0.24	.810	–0.154, 0.121	.0445 (0.0729)	0.61	.542	–0.098, 0.187

Predictor	Daily Trust in Strangers			
	b (SE)	z	p	95%CI
Intercept	–0.0026 (0.0264)	–	–	–
Prior day’s outcome variable	.0840 (0.0078)	10.8	<0.0001	.069, 0.099
Today’s perceived disease threat	.0126 (0.0080)	1.58	.114	–0.003, 0.028
Today’s actual disease threat	.0458 (0.0559)	0.82	.412	–0.064, 0.155
Average perceived disease threat	.0095 (0.0212)	0.45	.653	–0.032, 0.051
Average actual disease threat	–0.0272 (0.0194)	–1.40	.162	–0.065, 0.011
Time	–0.0018 (0.0015)	–1.20	.230	–0.005, 0.001
Study (Research Match vs. Prolific)	.0016 (0.0529)	0.03	.976	–0.102, 0.105
Study (Research Match vs. Qualtrics)	.0283 (0.0498)	0.57	.569	–0.069, 0.126
Study (Research Match vs. Undergrad)	–0.0055 (0.0772)	–0.07	.944	–0.206, 0.096

Note: Coefficients set to be random are italicized.

(Bolger and Laurenceau, 2013).⁴ We also included (1) the value of the trust outcome variable on the prior day to control for the autoregressive effects of time, (2) the linear fixed effect of time to control for the effects of collectively shared events on a given day or maturational changes, and (3) sample (dummy-coded, with 3 orthogonal contrasts).

⁴ We fit random coefficient models to intercepts and focal independent variables, following recommendations supporting the use of maximally random models (Barr et al., 2013). However, in complex models with multiple predictors, specifying multiple random effects can result in models failing to converge, making fixed specification appropriate on a case-by-case basis (Bates et al., 2018).

Table 3 presents the results of the integrative analysis.⁵ As expected, participants reported significantly *greater* trust in *collective caregivers* on days when COVID-19 posed a *more* immediate disease threat to them

⁵ As expected, on a daily basis, self-reported concern about COVID-19 and cases in the most populous nearest city captured *independent* reasons to be concerned about this disease threat. A multilevel model predicting the current day’s self-reported concerns about COVID-19 from a random intercept term, the current day’s number of COVID-19 cases in the most populous nearest city, average COVID-19 cases, and time revealed that the main effect of the current day’s COVID-19 cases was not significant, $b=.0059$, $SE=.0588$, $z = 0.10$, $p=.92$, $95\%CI(-.109, .121)$.

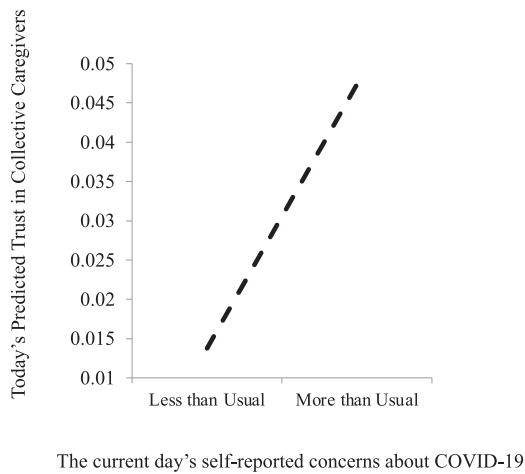


Fig. 1. Today's predicted trust in collective caregivers from perceived daily disease threat.

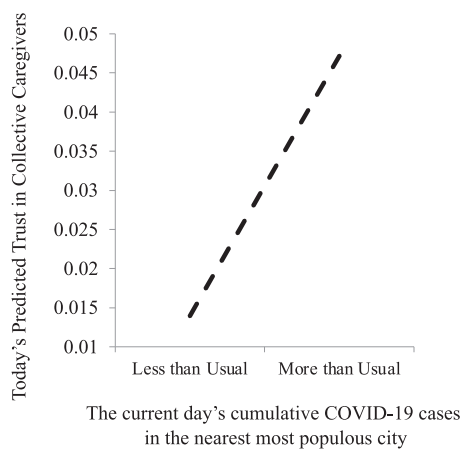


Fig. 2. Today's predicted trust in collective caregivers from actual daily disease threat.

than usual (1 *SD* above the participant's daily mean), as compared to days it posed a *less* immediate disease threat to them than usual (1 *SD* below the participant's daily mean). The main effect of daily disease threat predicting trust in collective caregivers was significant for both self-reported concerns about COVID-19 (i.e., *perceived* disease threat), captured by Fig. 1, and case counts in the nearest most populous city (i.e., *actual* disease threat), captured by Fig. 2.⁶ As Fig. 3 illustrates,

⁶ Even though the U.S. and the U.K. both had politically conservative governments at the point of data collection, the governmental systems differ in myriad ways (e.g., the national provision of health care in the U.K., but not the U.S.). Therefore, we also examined whether nationality (i.e., U.S. vs. U.K. resident) moderated the effects of daily disease threat (perceived or actual) on daily trust in collective caregivers. To do this, we estimated a further model that also included the main and interactive effects of the participant nationality. Neither the cross-level interaction between nationality and perceived disease threat, $b = .0298$, $SE = .0280$, $z = 1.06$, $p = .29$, $95\%CI(-.025, .085)$, nor the cross-level interaction between nationality and actual disease threat, $b = .2404$, $SE = 1.331$, $z = 0.18$, $p = .86$, $95\%CI(-2.37, 2.85)$, was significant predicting daily trust in collective caregivers. Regardless of nationality, participants reported greater trust in collective caregivers on days when they had greater (vs. less) reason to be concerned about COVID-19. For exploratory purposes, we also examined whether nationality moderated the effects of perceived and actual daily disease threat predicting daily trust in intimates and daily trust in strangers. Of the four possible interactions we tested in these exploratory analyses, only the interaction between actual daily disease threat and nationality predict-

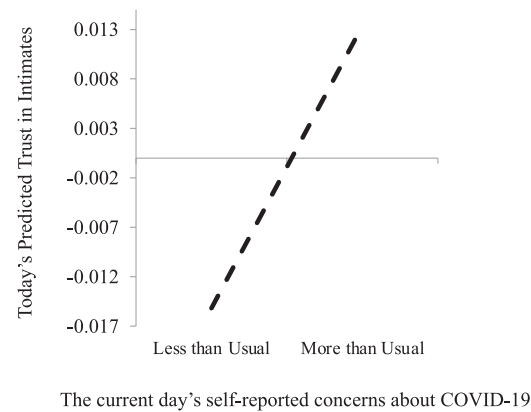


Fig. 3. Today's predicted trust in intimates from perceived daily disease threat.

participants also reported significantly greater *trust in intimates* on days they reported being *more* personally concerned about COVID-19 than they usually experienced (i.e., greater *perceived* disease threat), as compared to days they reported *less-than-usual* concern.⁷ The main effects of today's actual disease threat predicting trust in intimates and today's perceived and actual disease threat predicting trust in strangers were not significant.⁸

3.1.1. Further considerations

The analyses controlled for the main effect of sample, but did not examine whether sample significantly moderated the strength of the effects. Analyses that included the moderating effects of sample revealed that strength of the daily trust-bolstering effect for *intimates* did *not* significantly vary across samples. However, the strength of the trust-bolstering effect for *collective-caregivers* did significantly vary across samples (see SOM).

Specifically, participants in the ResearchMatch sample were *less* likely to bolster trust in collective caregivers, such as the President and U.S. Congress, in the face of disease threat, than participants in the other samples. In exploring reasons for this variability, we started with the assumption that people generally need to generate plausible reasons to believe what they want to believe (Kunda, 1990). The samples were all obtained under politically conservative administrations (President Donald Trump in the U.S. and Prime Minister Boris Johnson in the U.K), which should have made it harder for political liberals than conservatives to bolster their trust in collective caregivers, especially in the face of their conscious daily COVID-19 concerns. Not surprisingly, the ResearchMatch participants (all U.S. volunteers) were more politically

ing daily trust in strangers reached significance, $b = 2.52$, $SE = 1.28$, $z = -1.97$, $p = .0488$, $95\%CI(.011, 5.03)$. However, when we decomposed this unexpected interaction, the simple effect of actual disease threat predicting daily trust in strangers was not significant for U.S., $b = .0221$, $SE = .0576$, $z = 0.38$, $p = .704$, $95\%CI(-.091, .135)$, or U.K. participants, $b = -2.50$, $SE = 1.30$, $z = 1.92$, $p = .0549$, $95\%CI(-5.048, .048)$.

⁷ Because children are arguably less capable of providing either practical or symbolic protection against disease threats, we also conducted a further multilevel model predicting daily trust in adult intimates only (i.e., romantic partners, friends, and parents). Paralleling the effects in the main text, participants also reported greater trust in adult intimates on days they reported being more personally concerned about COVID-19 than usual, as compared to days they reported being less concerned, $b = .0232$, $SE = .0107$, $z = 2.17$, $p = .03$, $95\%CI(.002, .044)$.

⁸ We also examined whether the between-person means moderated the daily level effects. That is, we examined whether *average* disease threat (perceived or actual) interacted with today's disease threat (perceived or actual) to predict the daily trust outcomes. Only one significant interaction emerged (see SOM), which suggests the observed daily level effects generally did *not* depend on the average level of disease threat participants experienced across the diary period.

Table 4
Descriptive information about the Time 1 and Time 2 measures in Sample 1 and Sample 4.

Variable	Study 1 (Prolific Academic)				Study 4 (Qualtrics)			
	Initial Assessment		Two-Month Follow-up		Initial Assessment		Two-Month Follow-up	
	Mean (SD)	α	Mean (SD)	α	Mean (SD)	α	Mean (SD)	α
Own health worries	1.40 (1.17)	–	1.76 (1.19)	–	1.66 (1.10)	–	2.01 (1.28)	–
Friends/family health worries	1.79 (1.09)	.80	2.09 (1.04)	.77	1.85 (0.99)	.83	2.21 (1.14)	.81
Stranger health worries	1.56 (1.17)	–	1.60 (1.16)	–	1.64 (1.00)	–	1.95 (1.19)	–
Attachment security	3.29 (0.58)	.80	3.31 (0.54)	.77	3.40 (0.57)	.78	3.38 (0.58)	.76
Attachment insecurity	2.03 (0.53)	.58	2.03 (0.55)	.63	1.97 (0.49)	.53	1.93 (0.54)	.63
Trust in romantic partner	6.78 (1.53)	.90	6.60 (1.65)	.92	6.19 (1.90)	.92	6.43 (1.79)	.91
Trust in human good will	1.77 (1.20)	.74	1.75 (1.25)	.81	1.57 (1.19)	.71	1.63 (1.21)	.74
Fear-based xenophobia	2.55 (1.29)	.93	2.53 (1.31)	.93	2.37 (1.25)	.90	2.39 (1.29)	.92
Conspiratorial thinking	–0.37 (0.89)	.91	–0.33 (0.92)	.91	–0.04 (0.97)	.91	–0.09 (1.01)	.92

liberal than participants in other samples. Therefore, we explored the role that political orientation might play in explaining the sample variability. Including political orientation in the multilevel models revealed significant evidence of moderation. Regardless of partisanship, participants reported *greater* trust in collective caregivers on days when they had greater (vs. less) reason to be concerned about the disease threat posed by COVID-19. However, politically *neutral* and *conservative* participants reported significantly *greater* trust in collective caregivers on days when they self-reported *greater* (vs. less) than usual concern about COVID-19. However, politically *neutral* and *liberal* participants reported significantly *greater* trust in collective caregivers on days when COVID-19 infections in the nearest most populous city spread *more* (vs. less) than average. Thus, the expected main effects of daily disease threat might have been harder to detect in the ResearchMatch sample because its participants were the most ideologically liberal and ideologically liberal participants *only* bolstered trust in collective caregivers when they had greater *objective* daily reason to be concerned about COVID-19 (see the SOM for the analyses examining the moderating effect of political orientation).

3.2. Over time change: the adaptiveness of trusting in others in the face of daily disease threat

Table 4 presents the descriptive statistics for the Time 1 and Time 2 between-person measures, including internal consistencies. Using multilevel models, we first created individual difference measures capturing how readily each participant in Sample 1 and Sample 4 reassured themselves of the respective trustworthiness of intimates, collective caregivers, and strangers in the face of either perceived or actual daily reason to be concerned about COVID-19.

We estimated each individual-difference measure of the tendency to trust in others more in the face of greater daily disease threat using multilevel models. The models we estimated captured, at the individual level, the relation between (high vs. low) daily disease threat and (high vs. low) trust in personal connections, collective caregivers, and strangers, respectively. Specifically, in each of the multilevel models we conducted for Samples 1 and 4 (3 targets of trust by 2 daily disease threats), we predicted today's trust (e.g., trust in intimates) from a random intercept, the prior day's trust in this target (person-centered), the current day's *perceived* disease threat (i.e., self-reported concerns about COVID-19, person-centered), the current day's *actual* disease threat (i.e., cumulative cases in the nearest most populous city), average perceived disease threat, average actual disease threat, and the fixed effect of time. Importantly, including time separated daily changes in trust associated with any daily changes in disease threat from maturational processes in participants, historical artifacts associated with the passage of time, and daily tendencies for trust to be more or less stable over time. In these models, the residual component of the (random) slope for each

index of disease threat captured our key predictor – how strongly each participant reassured themselves of the trustworthiness of a specific social connection in the face of relative increases in daily disease threat, whether perceived (i.e., self-reported concerns) or actual (i.e., COVID-19 cases). For instance, for *trust in collective caregivers*, a more *positive* slope residual for *actual* disease threat captures a person's *stronger* tendency to trust *more* in collective caregivers on *higher* actual threat days, whereas a less positive (or even negative) slope residual captures a weaker such tendency.⁹

We assumed that participants would later feel safer and more secure in social connection to the extent they were likely to reassure themselves of the trustworthiness of *any* of the targets we examined, and that trusting more in any one of these targets, whether intimates, collective caregivers, or strangers, might lessen the need to trust more in *other* targets. Consistent with this substitutability logic, within each type of daily disease threat (i.e., perceived vs. actual), the tendency to affirm trust in any one target (i.e., intimates, collective caregivers, or strangers) was only modestly associated with the tendency to affirm trust in any other target (see Table 5). To ensure that the analyses captured the idea that participants could similarly defend against actual (or perceived) disease threats by defensively trusting any target, we created two composite indices (Diamantopoulos et al., 2008). The first captured each participant's *overall* tendency to reassure themselves of the trustworthiness of others in the face of *perceived* disease threats (i.e., averaging across intimates, collective caregivers, and strangers). The second captured the participant's *overall* tendency to reassure themselves of the trustworthiness of others in the face of *actual* disease threats (i.e., averaging across intimates, collective caregivers and strangers). Mirroring our substitutability logic, these composite indices allowed individual participants to affirm (or not affirm) trust in *idiosyncratic* ways (i.e., through intimates, collective caregivers, and/or strangers), while still being considered a person who was generally more (vs. less) likely to reassure themselves of the trustworthiness of others on high disease-threat days.

After creating these composite individual differences indices, we combined these indices and the relevant Time 1 and Time 2 measures from Samples 1 and 4 within an integrative data set, after first *z*-scoring Times 1 and 2 measures within each study. We then conducted simultaneous regression analyses separately predicting perceptions of physical, interpersonal, and collective safety and security in social connection at Time 2 from the main effects of the (1) corresponding perception of safety and security at Time 1, (2) the composite index capturing individual differences in the tendency to reassure oneself of the trustworthiness

⁹ We estimated these models separately for each sample so that the residual slope individual difference measures of trusting in others in the face of daily disease threat would be standardized within sample, as was the case with all of the other measures.

Table 5
Intercorrelations among the individual-difference measures of trusting in the face of greater daily disease threat.

	1	2	3	4	5	6
1. Trusting in intimates in the face of actual daily disease threat	1.00					
2. Trusting in collective caregivers in the face of actual daily disease threat	.240**	1.00				
3. Trusting in strangers in the face of actual daily disease threat	.145*	.060	1.00			
4. Trusting in intimates in the face of perceived daily disease threat	-0.229**	-0.023	-0.060	1.00		
5. Trusting in collective caregivers in the face of perceived daily disease threat	-0.065	-0.080	-0.107**	.214**	1.00	
6. Trusting in strangers in the face of perceived daily disease threat	.031	-0.061	.043	.035	-0.060	1.00

* $p < .05$, ** $p < .01$.

of others in the face of *perceived* daily disease threat, (3) the composite index capturing individual differences in the tendency to reassure oneself of the trustworthiness of others in the face of *actual* daily disease threat, and (4) sample (0=Prolific Academic, 1=Qualtrics).

Table 6 presents the results.¹⁰ Parallel effects emerged in analyses that utilized individual differences in the tendency to reassure oneself of the trustworthiness of others in the face of *perceived* daily disease threat and individual differences in the tendency to reassure oneself of the trustworthiness of others in the face of *actual* daily disease threat as *separate*, rather than simultaneous predictors of change in physical, interpersonal, and collective security (see SOM).

3.2.1. Changes in physical safety and security

Table 6 reveals the expected significant main effects of trusting in others in the face of *actual* daily disease threat for worries about the physical health of (1) oneself and (2) friends and families (which we averaged at each time point). As expected, two months further into the pandemic, participants who initially were *more* likely to trust more in others in the face of *greater* than usual spread of infections in the nearest most populous city reported being significantly *less* worried about their own physical health and marginally *less* worried about the physical health of their friends and family members than participants who initially were *less* likely to reassure themselves in this way. No significant effects emerged predicting changes in physical safety and security for strangers, or for any of the three entities when utilizing individual differences in trusting in the face of *perceived* daily disease threats.

3.2.2. Changes in interpersonal safety and security

We computed a composite index of interpersonal safety and security by averaging trust in the romantic partner, attachment security, attachment insecurity (reversed) at Times 1 ($\alpha_{\text{Sample1}}=0.56$, $\alpha_{\text{Sample4}}=0.57$) and 2 ($\alpha_{\text{Sample1}}=0.64$, $\alpha_{\text{Sample4}}=0.56$). Table 6 reveals the expected positive and significant main effect of trusting in others in the face of *actual* daily disease threat. Two months later, participants who initially were *more* likely to trust more in others in the face of the *greater* than usual daily spread of infections in the nearest most populous city later evidenced significantly *greater* safety and security in interpersonal relationships than participants who were less likely to reassure themselves in this way. Inspecting the individual components of the interpersonal safety and security composite revealed that the main effect of trusting in the face of actual disease threat was significantly positive, as expected, predicting *increased* attachment security, $\beta=0.099$, $t(810)=3.41$, $p=.0007$, $95\%CI(0.071, 0.264)$, marginally

¹⁰ In Sample 1, the multilevel models predicting today's trust in collective caregivers from actual disease threat failed to converge, making it impossible to estimate a residual slope to capture individual differences in the strength of the tendency to reassure oneself of the trustworthiness of collective caregivers in the face of actual daily disease threat. Thus, in Sample 1, the composite index of individual differences to reassure oneself of the trustworthiness of others in the face of *actual* daily disease threat captured the tendency to affirm trust in intimates and strangers in the face of actual disease threats, whereas in Sample 4, it captured the tendency to affirm trust in intimates, collective caregivers, and strangers in the face of actual daily disease threats.

negative, as expected, predicting decreased attachment insecurity, $\beta=-0.040$, $t(810)=-1.65$, $p=.099$, $95\%CI(-0.145, 0.012)$, and not significant predicting trust in romantic partners, $\beta=0.024$, $t(798)=1.09$, $p=.278$, $95\%CI(-0.032, 0.110)$. No significant effects emerged for trusting in others in the face of *perceived* daily disease threats.

3.3.3. Changes in collective safety and security

We computed a composite index of collective safety and security at Times 1 and 2 by averaging trust in human goodwill, conspiratorial thinking (reversed), and fear-based xenophobia (reversed) at Times 1 ($\alpha_{\text{Sample1}}=0.54$, $\alpha_{\text{Sample4}}=0.52$) and 2 ($\alpha_{\text{Sample1}}=0.55$, $\alpha_{\text{Sample4}}=0.50$). Table 6 also reveals the expected positive and significant main effect of trust-bolstering in the face of actual disease threat. Two months later, participants who initially were *more* likely to trust more in others in the face of the *greater* than usual daily spread of infections in the nearest most populous city evidenced significantly *greater* safety and security in their collective relationships than participants who initially were less likely to reassure themselves in this way. Inspecting the individual components of the collective safety and security composite revealed that the main effect of trusting in the face of actual daily disease threat was significantly positive, as expected, predicting increased trust in others' good will, $\beta=0.087$, $t(810)=3.42$, $p=.0009$, $95\%CI(0.063, 0.232)$, significantly negative, as expected, predicting decreased fear-based xenophobia, $\beta=-0.049$, $t(810)=-2.57$, $p=.01$, $95\%CI(-0.144, -0.019)$, and not significant predicting conspiratorial thinking, $\beta=-0.021$, $t(809)=-0.97$, $p=.332$, $95\%CI(-0.109, 0.037)$. No significant effects emerged for trusting in the face of daily *perceived* disease threats.

3.3.4. Further considerations

In interpreting the meaning of these effects, there are at least three issues to consider. First, the composite index of trusting in the face of daily disease threat allowed individuals to bolster trust in any of the targets, consistent with our view that bolstering trust in any of the targets should work toward making social connection feel physically, interpersonally, and collectively safer and more secure. However, relying on this composite index cannot reveal whether it is especially important to reassure oneself of the trustworthiness of *particular* targets to feel physically, interpersonally, or collectively safe. To see if this was the case, we estimated further multilevel models predicting changes in physical, interpersonal, and collective safety and security from individual differences in the tendency to trust in *personal* (i.e., intimates) as opposed to *collective* (i.e., collective caregivers and strangers) entities in the face of daily perceived versus actual disease threat (see Supplementary Tables 1 and 2). These analyses suggest that trusting in intimates in the face of actual daily disease threat is especially important in predicting later interpersonal safety and security, whereas trusting in collective caregivers and strangers in the face of actual daily disease threat is especially important in predicting later physical and collective safety and security.

Second, people who are *more* likely to trust in others in the face of daily disease threats may be more safe and secure in the first place. Our approach makes this artifactual explanation for the observed effects unlikely. The daily items that we used to create the individual difference measures of trusting in others in the face of daily disease threat at Time 1 shared (1) *no* content overlap with the daily items we

Table 6
Integrative analysis predicting changes in safety and security in social connection at Time 2 from individual differences in the tendencies to trust in others in the face of actual and perceived daily disease threats at Time 1.

Predictor	Own Health Worries at Time 2				Friend/Family Health Worries at Time 2				Stranger Health Worries at Time 2			
	β	t	P	95%CI	β	t	P	95%CI	β	t	P	95%CI
Time 1 outcome	.674	26.1	< 0.0001	.618, 0.718	.678	26.3	< 0.0001	.600, 0.697	.647	24.1	< 0.0001	.592, 0.697
Trusting in the face of actual daily disease threat	-0.062	-2.40	.017	-0.191, -0.019	-0.050	-1.92	.055	-0.156, 0.002	.016	0.60	.552	-0.062, 0.116
Trusting in the face of perceived daily disease threat	.019	0.75	.454	-0.556, 1.242	-0.002	-0.08	.935	-0.859, 0.790	-0.039	-1.45	.146	-1.62, 0.241
Sample	-0.028	-1.07	.287	-0.078, 0.023	-0.029	-1.13	.258	-0.073, 0.019	-0.004	-0.15	.879	-0.056, 0.048
Predictor	Interpersonal Security at Time 2				Collective Security at Time 2							
	β	t	P	95%CI	β	t	P	95%CI				
Time 1 outcome	.736	31.1	< 0.0001	.694, 0.788	.823	42.1	< 0.0001	.779, 0.856				
Trusting in the face of actual daily disease threat	.064	2.68	.007	.021, 0.137	.064	3.27	0.001	.031, 0.124				
Trusting in the face of perceived daily disease threat	-0.021	-0.90	.370	-0.868, 0.324	.001	0.07	.942	-0.462, 0.497				
Sample	.019	0.83	.406	-0.019, 0.048	.015	0.77	.441	-0.016, 0.038				

used to measure physical safety and security at Times 1 and 2 and (2) *no* content overlap with the personality measures we used to index interpersonal and collective safety and security at Times 1 and 2. Thus, there is no obvious methodological artifact that could explain why participants who were initially more likely to trust in others in the face of infections spreading in the nearest most populous city later evidenced greater safety and security. Also, the integrative regression analyses predicted *change* in physical, interpersonal, and collective safety and security over time. Therefore, any general disposition for people who are more likely to reassure themselves of the trustworthiness of others in the face of greater daily disease threat cannot explain the long-term benefits of trust-bolstering because they emerged controlling for Time 1 safety and security.

Third, the longitudinal effects did not vary across nationality or across samples. When we separately added the moderating effects of nationality and sample to the regression models predicting each Time 2 outcome variable, no significant interactions emerged (see SOM).

4. Discussion

People generally want to feel safe rather than vulnerable depending on others (Mikulincer and Shaver, 2003), but the onset of the COVID-19 pandemic put the strength of this motivation to an unprecedented test. Because pandemic pathogens require collective cooperation to contain, we expected people to defend the safety and security in social connection by defensively reassuring themselves of the trustworthiness of others on days they had *greater* (vs. less) reason to be concerned about COVID-19. We also expected individuals who were *more* likely to reassure themselves in this way early in the pandemic to evidence an *increased* sense of physical, interpersonal, and collective safety and security in social connection two months further into the pandemic.

4.1. Trusting in others in the face of daily collective disease threats

The integrative analysis of the four daily diary samples provided solid evidence that people are more *likely* to trust others on days when they had *greater* (vs. less) reason to be concerned about COVID-19. Specifically, participants reported significantly *greater* trust in intimates and significantly *greater* trust in collective caregivers on days when they personally perceived *greater* than usual reason to be concerned about COVID-19, as compared to days they personally perceived *less* than usual reason to be concerned. Participants also reported significantly *greater* trust in collective caregivers on days when they faced *greater* than usual actual risk of community spread, as captured by a greater than average number of total cases in the nearest most populous city. However, such average tendencies to be more trusting in the face of daily disease threat did not extend to strangers, perhaps because affirming trust in intimates and collective caregivers obviated the need for a further defense (Jonas et al., 2014).

Moreover, two months later, those participants who initially were *more* likely to reassure themselves of the trustworthiness of others in the face of *greater* than usual spread of COVID-19 cases in the geographically nearest most populous city seemed to thrive. Specifically, participants who were *more* likely to trust *more* in others in the face of greater *actual* daily disease threat later reported less worry about their own physical health and the physical health of family and friends, as compared to participants who were *less* likely to reassure themselves in this way. Participants who were *more* likely to trust more in others in the face of *greater* actual daily disease threat also evidenced significantly *greater* safety and security in interpersonal social connections, as shown most markedly by *increases* in attachment security. They further evidenced significantly *greater* safety and security in collective social connections, as shown most markedly by increased trust in human good will and *decreased* xenophobia or fear of outsiders.

Prior research suggests that focusing attention on defensive or motivated processes can lessen the security they afford (Hicks et al., 2020;

Murray et al., 2008). Consistent with this prior research, individual differences in the tendency to reassure oneself of the trustworthiness of others only predicted increases in safety and security over time when participants reassured themselves in the face of the implicit disease threat posed by case counts in the nearest most populous city. No benefits emerged for individual differences in trusting in the face of *perceived* (i.e., self-reported) disease threat (even in models where we separately examined trusting in the face of actual and perceived disease threats). Although this reasoning is speculative, it might be the case that people are more aware of turning to others for symbolic respite from their conscious concerns about COVID-19. Consequently, they might be more likely to reconsider or reevaluate defensive affirmations of trust over time when others cannot alleviate the ongoing pandemic threat.

4.2. Strengths and limitations

On the side of strengths, the present studies are the first to reveal how trust in others dynamically shifts in the face of widespread and prolonged disease threats in daily life. They are also the first to suggest that such *daily* disease threats might motivate people to trust others more, rather than less. The present studies are also the first to examine how individual differences in the tendency to reassure oneself of the trustworthiness of others in the face of a collectively-faced daily disease threat transform the perceived physical and social risks of pandemic living over a period of several months. Also, on the side of strengths, the daily-level effects robustly emerged across four daily diary studies involving almost 2800 participants and the longitudinal effects emerged across two follow-ups involving over 800 participants. Furthermore, in estimating the individual difference measures of trusting in others in the face of daily disease threat, we controlled for time in the daily-level models. Importantly, this control helps distinguish individual differences in the tendency to reassure oneself of the trustworthiness of others in the face of daily disease threat from (a) individual differences in trust stability and (b) historical artifacts and maturational processes associated with the passage of time.

On the side of limitations, because this is a non-experimental field study, we are not able to pinpoint the precise mechanisms, whether perceptual or behavioral, that allowed participants to trust more in others in the face of *greater* daily disease threat. Theory and research on motivated cognition suggests that the desire to reach a particular conclusion motivates people to build a plausible case for their desired beliefs (Kunda, 1990). This could happen perceptually and/or behaviorally. As one perceptual mechanism, perhaps days when people had *more* reason to be concerned about COVID-19 selectively focused attention on news that affirmed the government had the pandemic well in hand. The exploratory analyses that suggested political moderates and conservatives were more likely to bolster trust in collective caregivers in the face of conscious disease threat points to this possibility (as the news outlets moderates and conservatives favored might provide greater fodder for increased trust than the news outlets liberals favored). As one behavioral mechanism, perhaps days when people had *more* reason to be concerned about COVID-19 selectively directed behavior, leading people to solicit the support of intimates, which is known to make them seem more trustworthy (Lemay & Clark, 2008).

Also, on the side of limitations, we tested the daily hypotheses using same-day perceptions, assuming that compensation is likely to be relatively immediate. That is, we assume that having great reason to be concerned about COVID-19 on a given day would motivate participants to reassure themselves of the trustworthiness of others that same day. Unfortunately, using same-day perceptions of trust and threat invites the possibility of reverse-causation or third variable explanations for the effects. However, the convergence between the daily findings for perceived and actual disease threat helps rule out this possibility. After all, an individual participant's daily trust in collective caregivers cannot conceivably cause the number of COVID-19 cases in the nearest most populous city that same day. Finally, the effects were admittedly

small (see SOM), but this is to be expected in naturalistic field studies given the subtlety of the predictors and the fact that trust is multiply determined (Götz et al., 2021).

4.3. Innovation and applications

The present findings also suggest important innovations to psychological theory and public health policy. In terms of theory, they suggest that disease threats may operate differently in the laboratory than in everyday life (Mortensen et al., 2010; Sacco et al., 2014). Laboratory threats are often transient, which makes temporarily avoiding others a viable and effective means of managing disease threat. However, the present research suggests that real-life, widespread and prolonged viral threats may instead motivate people to trust in others because outbreaks require social cooperation to contain. The present research is also among the first to point to micro-level psychological processes within individuals that could lead to macro-level differences in societies facing greater or lesser pathogen prevalence (Fincher et al., 2008; Kim et al., 2016). Just as the acute threat of COVID-19 spreading into one's community seemed to motivate people to trust more in others, environments with high pathogen prevalence might condition their inhabitants to trust one another to provide physical protection. In this way, the trust-bolstering motivations evident in the psyches of individual people in pathogen-prevalent environments could create culturally-shared tendencies to embrace collectivistic norms.

In terms of application, the present results suggest that escalating numbers of infections can paradoxically increase human needs to trust rather than distrust others. Rather than using fear appeals to frighten people into compliance, public health messages that affirm the safety, security, and value of shared social connections might increase public willingness to take the personal steps needed to keep others physically protected against COVID-19. Focusing people specifically on the partnerships they share with their governments and fellow citizens, and the safety and security such partnerships can afford, may not only give people reason to trust that others will keep them safe, but it might increase their motivation to keep others safe as well (Van Lange and Rand, 2022).

5. Conclusion

Although interpersonal wariness can readily protect against transient and easily avoided disease pathogens, prolonged pathogen risks such as pandemics require collective cooperation to contain. In the case of such collectively-faced disease threats, the present findings suggest that people are motivated to trust *more* in others, thereby reassuring themselves that others can and will behave cooperatively and responsibly. Indeed, those individuals who were most likely to reassure themselves of the trustworthiness of others in the face of daily escalations of COVID-19 infections in nearby communities later evidenced greater safety and security in social connections.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Availability of data is described in the SOM.

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Supplementary materials

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