



No Evidence for Social Surrogacy in Fostering Intentions to Follow Social Distancing Guidelines

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Abstract: We tested whether temporary social needs satisfaction through social surrogacy would ensure greater willingness to adhere to social distancing recommendations elicited by the COVID-19 pandemic. Participants were randomly assigned to social exclusion or inclusion via Cyberball ($n = 534$) followed by either a social surrogacy manipulation (imagine favorite TV show), or one of two control states. No restorative effects emerged following a social surrogacy prime. An exploratory analysis considering age as a moderator ($M_{Age} = 36.89$ years, $SD = 10.88$, range = 19–70 years) found that excluded adults (i.e., middle and older ages) reported more intentions to deviate following surrogacy experiences relative to control experiences; no effects emerged for younger adults in this analysis. We discuss the limitations of social surrogacy in fostering compliance with social distancing initiatives.

Keywords: COVID-19, social distancing, exclusion, social surrogacy, evolutionary psychology, adulthood [Author: please reduce to 5 key words]

The highly communicable nature of the novel coronavirus (COVID-19) made it critical to implement strategies that would minimize spread during the height of the pandemic. One of the most effective means found to prevent the spread of this virus, among others historically, is social distancing to decrease the interpersonal contact required for disease transmission (Moore et al., 2020). Social distancing typically involves an extended period of limited physical contact, as physical contact is the primary transmission vehicle of communicable disease. However, limited contact with others can thwart the sense of belonging, a critical human motivation that runs counter to disease-avoidance strategies. Loneliness nonetheless takes a dramatic toll on both physical and psychological health (Cohen & Janicki-Deverts, 2009). Various measures of lockdown (e.g., shelter-in-place orders) and isolation have proven psychologically taxing, leading to increased rates of anxiety and depressive disorders across several countries (e.g., Brooks et al., 2020; Bueno-Notivol et al., 2021; but see Appleby et al., 2021).

The evolutionary importance of social affiliation and disease-avoidance presents a challenge to humans. The satisfaction of one of these goals comes at the expense of the other. The more salient one of these needs is, the more willing one will be to forego satiating the other. Extended social distancing during the pandemic could have satisfied disease

avoidance goals at the expense of social affiliation goals. Continually unsatisfied social affiliation goals may lead individuals to downregulate their disease concerns in the service of addressing unmet affiliative needs (Sacco et al., 2014). Consistent with this logic, individuals display increased risk-taking following exclusionary experiences to ensure access to social connections (Van Beest & Williams, 2006). However, deviation from social distancing guidelines elicits substantial increases in COVID-19 cases (Gagnon et al., 2020). It thus became critical to identify strategies in contemporary environments that simultaneously satisfy affiliation needs without jeopardizing disease avoidance goals (Brown et al. [Author: please update], in press; Young et al., 2021).

To reduce the likelihood of deviation from various social distancing initiatives, it could be advantageous to consider providing oneself supplementary affiliative opportunities that do not require direct interpersonal contact (Paravati et al., 2021). Previous research indicates social surrogacy, often through vicarious relationships between an individual and a media figure (e.g., celebrities, fictional characters, cartoons), are perceived similarly to real relationships by those involved and allow individuals to use surrogate opportunities to simulate physical interactions (De Backer, 2012; Gabriel et al., 2016). Surrogacy can foster belonging (Derrick et al., 2009), which could be effective for ensuring

75 adherence to social distancing and leveraged to help people
76 tolerate physical separation while avoiding the distress of
77 loneliness. The current study sought to demonstrate the
78 efficacy of this process as an intervention to foster adher-
79 ence to social distancing guidelines during the summer of
80 2020.

81 Tradeoffs in Affiliation and Pathogen 82 Avoidance

83 Humans are a social species whose survival has historically
84 been contingent upon the cultivation and maintenance of
85 social bonds through group living (Baumeister & Leary,
86 1995). Inclusion within groups affords continued access to
87 resources allocated through cooperation and increased
88 reproductive opportunities. It has been argued the potential
89 consequences of exclusion from group living led to the evo-
90 lution of a sociometer in humans (Leary & Baumeister,
91 2000). The sociometer is a psychological alarm system that
92 enacts following exclusionary experiences and motivates
93 individuals to identify affiliative opportunities to ensure
94 inclusion (Leary et al., 1995), heightening prosociality
95 (Maner et al., 2007), cooperation (Williams & Sommer,
96 1997), and interest in gregarious others (Brown et al.
97 [Author: Brown, Medlin, et al. or Brown, Sacco, et al. Please clarify], 2019).

98 Although this motivation provides benefits for group liv-
99 ing, such desires to reaffiliate require the invocation of a
100 tradeoff. Increased affiliative opportunities ultimately pro-
101 vide increased opportunities for extensive interpersonal
102 contact, despite it being conducive to disease transmission
103 in densely populated ecologies (Hoang et al., 2019; Salathé
104 et al., 2010; Jones et al., 2008). It has been further argued
105 humans have concurrently evolved a motivational system
106 to identify and avoid pathogenic threats, typically deemed
107 a behavioral immune system (Murray & Schaller, 2016).
108 Behavioral immune system activation facilitates identifica-
109 tion of pathogenically threatening environments (Wang &
110 Ackerman, 2019) and conspecifics (Ackerman et al.,
111 2009; Young et al., 2011), along with an aversion to inter-
112 personal contact (Mortensen et al., 2010; Sawada et al.,
113 2018; Schaller & Murray, 2008). Concerns of the COVID-
114 19 pandemic further foster disinterest in interpersonal con-
115 tact (Makhanova & Shepherd, 2020).

116 Activation of the sociometer may nonetheless downregu-
117 late the behavioral immune system if the former threat is
118 more acutely salient than the latter threat. Affiliative and
119 pathogen-avoidant motives appear to work in direct opposi-
120 tion of each other, wherein satisfaction of one motive is
121 necessarily at the expense of satisfaction of the other.
122 Exclusionary experiences both downregulate individuals'
123 motivational state to avoid pathogens and reduce sensitivity
124 toward facial features connoting poor health (i.e., facial

125 asymmetry) that could leave individuals more vulnerable
126 to infection (Sacco et al., 2014). Chronic and acute activa-
127 tion of affiliative motives further heightens preferences
128 for extraverted interaction partners (Brown & Sacco,
129 2017; Brown et al. [Author: Brown, Medlin, et al. or
130 Brown, Sacco, et al. Please clarify], 2019). Despite
131 extraversion affording the opportunity to cultivate social
132 bonds, the increased interpersonal contact guaranteed from
133 these networks increases the risk of exposure to infectious
134 disease (Nettle, 2005; Pollet et al., 2011). Individuals who
135 perceive themselves as susceptible to infectious disease
136 downregulate this preference for extraverted faces, which
137 likely helps reduce disease transmission at the expense of
138 affiliative opportunities (Brown & Sacco, 2016). Oversatu-
139 rating interpersonal contact through crowding manipula-
140 tions further heightens perceptions of oneself as
141 vulnerable to disease (Brown & Sacco, [Author: Please
142 update], in press). This suggests individuals are willing to
143 incur costs of disease if affiliative needs are thwarted
144 (Brown et al., [Author: Please update], in press). This will-
145 ingness to seek affiliative contact following extended peri-
146 ods of social isolation may prove deleterious during a
147 pandemic with a virulent pathogen. Given compliance with
148 social distancing guidelines necessarily frustrates belong-
149 ingness needs, compliance may upregulate individuals'
150 desire to reaffiliate and therefore incur the risk of contract-
151 ing the disease.
152

153 Buffering Effects of Social Surrogacy

154 The absence of affiliative opportunities through interper-
155 sonal contact frequently results in the reliance on various
156 social surrogates to satisfy salient affiliative needs. For
157 example, reminders of one's own pets buffer individuals
158 from feelings of loneliness and satisfy basic affiliative needs
159 (McConnell et al., 2011). Going further into relationships,
160 individuals rely on social surrogacy to supplement existing
161 affiliative connections (Gabriel et al., 2016; Paravati et al.,
162 2021). Such parasocial bonds are especially prevalent
163 among individuals with a chronically high desire for social
164 connections (Greenwood & Long, 2009).

165 Even though social surrogacy often represents one-sided
166 exchanges between a perceiver and a media figure of
167 choice, social surrogacy nonetheless provides myriad posi-
168 tive outcomes. Individuals frequently experience a restora-
169 tion in self-control when reminded of social surrogacy
170 (Derrick, 2013) and feel closer to their ideal selves, particu-
171 larly when they have low self-esteem (Derrick et al., 2008).
172 Most germane to this conversation is the fact that individu-
173 als' engagement in these relationships, as if they are real,
174 similarly satisfies belongingness needs (Derrick et al.,
175 2009). Restored belonging may facilitate satisfaction of
176 especially salient affiliative motives during extended periods

of social distancing for which humans did not necessarily evolve. This could implicate social surrogacy as an effective strategy for ensuring one's needs are met without incurring costs of disease transmission through physical interaction during pandemics.

Age Differences in Affiliative Interests

Although the need to belong (NTB) remains a pervasive motivation across the lifespan, older and younger adults may experience and satisfy the need differently. For example, older adults (both mature and elderly) experience less fear of missing out (FOMO) from social gatherings and other activities that facilitate social connections, whereas younger adults' heightened FOMO motivates engagement in risky behaviors that could serve to increase affiliative opportunities (e.g., alcohol use; Przybylski et al., 2013; Riordan et al., 2015; cf. Barry & Wong, 2020). This motivation could increase interest among younger adults to deviate from social distancing, a motivation that may be further amplified through knowledge of age differences in mortality from COVID-19. That is, older adults are at greater risk of dying from the virus compared to younger adults (Richardson et al., 2020), with younger adults potentially feeling more capable of incurring costs of infection, albeit capable of spreading the virus to vulnerable populations.

Younger adults' considerable engagement with social media may suggest that social surrogacy could be effective in preventing these individuals from deviating from social distancing guidelines (Przybylski et al., 2013). In particular, young adults may be more connected to media figures than older adults. Consistent with this, younger people are more likely to binge-watch television, use the medium to regulate their emotions, and seek out emotions of suspense and anticipation (Rubenking & Bracken, 2018). Younger adults are additionally more ready to engage in alternative forms of media such as social media and YouTube (Chen, 2020), which could provide additional satisfaction of affiliative needs for those demographics. Thus, younger adults may be more inclined to turn to social surrogates when their affiliative needs are unmet, given their greater opportunities for pursuing such relationships.

Current Research

This study sought to consider the extent social surrogacy serves to reduce motivations to reaffiliate through physical contact following an exclusionary experience, as means to reduce the likelihood of incurring the risks of disease transmission in a pandemic. We predicted that following exclusionary experiences, reminders of a social surrogate would satisfy participants' affiliative needs, thus reducing interest in deviating from social distancing guidelines to curb the

spread of COVID-19. Importantly, we predicted the salience of social surrogacy would elicit greater compliance intentions than a control state following an exclusionary experience but would be comparable to an actual relationship.

We further predicted the basis of this continued intended adherence of social distancing guidelines would be rooted in various motivational states, prompting us to consider several proposed mediators. First, given that social surrogacy is predicted to replenish affiliative needs following exclusion (Derrick et al., 2009), we predicted that a heightened satisfaction of basic needs will partially mediate this process. Additionally, this satisfaction of affiliative needs should necessarily reduce individuals' momentary NTB because of the salience of their social surrogacy; this leads us to predict that a reduction in the state-level NTB will also partially mediate this process. Finally, because these affiliative motives work in opposition to pathogen-avoidant motives (Sacco et al., 2014), we predicted that the restoration of affiliative motives would shift attention back to pathogen-avoidant concerns and therefore upregulate state-level perceived vulnerability to disease (PVD), which would partially mediate this process itself. We offer no a priori predictions over which mediator would elicit the strongest basis in the proposed effects.

We were also interested in the effects of age in the current study given younger adults' greater interest in risk-taking to satisfy affiliative motives (e.g., Przybylski et al., 2013). This prompted us to conduct exploratory analyses considering age as a moderator. We tentatively predicted providing social surrogacy opportunities for younger adults following exclusion would be especially effective in reducing deviance from social distancing guidelines. Testing the efficacy of simple and easily enacted interventions that may improve social distancing behaviors is a highly important task. The present results would nonetheless be informative and relevant to behavior during pandemics regardless of the outcome. To ensure that results were highly powered and transparent, we pre-registered the current experiment, report all materials, measures, and manipulations while describing all exclusions made. Data, materials, and the pre-registration plan are available at: https://osf.io/5s4mq/?view_only=f89d9a5c21fb431eb555d6613d0b278d

Method

Participants

We recruited 638 US participants through Amazon's Mechanical Turk in exchange for \$5.00 (USD) in late July 2020 during the COVID-19 pandemic. An a priori power analysis indicated 495 participants would sufficiently detect

275 small-medium effects (Cohen's $f = 0.15$, $1 - \beta = 0.80$). We
 276 deliberately oversampled in the event we had to exclude
 277 responses and did not analyze our data until we attained
 278 sufficient power.

279 We excluded 104 participants from the final analyses.
 280 Exclusions were based on either failing one of the various
 281 attention checks that explicitly told participants to respond
 282 with a specific answer (e.g., not clicking the button labeled
 283 as "4" when prompted) or not responding to the actual nar-
 284 rative prompts (e.g., nonsense, off-topic). This resulted in a
 285 final sample of 534 participants (331 men, 200 women, 2
 286 identifying as other; $M_{Age} = 36.89$ years, $SD = 10.88$, range =
 287 19–70 years; 74.3% White). The age distribution of our sam-
 288 ple was normal (skew = 1.01, $SE = 0.10$; kurtosis = 0.25, SE
 289 = 0.21), justifying our inclusion of age as a moderator. We
 290 nonetheless recognize our "older" adults have a stronger
 291 representation of individuals likely classified as middle-
 292 aged (i.e., $+1 SD = 47.77$ years; McAdams, 2001).

293 Procedure

294 Consenting participants were randomly assigned to be
 295 included or excluded in Cyberball, a simulated online
 296 boss-tossing experience to manipulate inclusionary status,
 297 which is described in detail in the subsequent section
 298 (Williams & Jarvis, 2006). Immediately following Cyber-
 299 ball, participants were then randomly assigned to write
 300 about one of the three interaction prompts further
 301 described below. This was followed by reporting responding
 302 to questionnaires described below in a randomized order
 303 (both presentation of questionnaires and items) and manip-
 304 ulation checks. Finally, participants responded to the social
 305 distancing deviance measure before providing demograph-
 306 ics information and attitudes toward the pandemic.

307 Materials

308 Cyberball

309 Participants played Cyberball (Williams & Jarvis, 2006).
 310 Two other players existed as preprogrammed agents who
 311 either included or excluded participants during 30 tosses
 312 of the ball. Exclusion occurred when agents ceased
 313 throwing to participants after a predetermined number of
 314 inclusionary throws ($n = 267$), whereas continued passing
 315 of the ball throughout the duration of the trial was inclusion
 316 ($n = 267$). Our decision to utilize Cyberball in the current
 317 study was because of its capability in acutely thwarting
 318 belonging needs that could approximate the same needs
 319 dissatisfaction experienced by individuals in quarantine,

320 though we acknowledge this manipulation serves only as
 321 a potential proxy for the unique belongingness dissatisfac-
 322 tion stemming from the chronic isolation of a pandemic
 323 quarantine.

324 Social Surrogacy Prompts

325 Following Cyberball, participants wrote about one of three
 326 experiences for five minutes (Derrick et al., 2009): watch-
 327 ing their favorite television show to elicit salience of a
 328 parasocial relationship ($n = 173$), watching whatever was
 329 on television as a control condition ($n = 172$), or an experi-
 330 ence in real life with their best friend to elicit salience of an
 331 actual relationship ($n = 189$). The third condition was devel-
 332 oped for this experience as a secondary control. Because
 333 the parasocial relationship prime may be more appropri-
 334 ately categorized as an immersion into narrative social
 335 worlds, based on updated theoretical frameworks from
 336 when the prime was originally used (Gabriel et al., 2016),
 337 we refer to that narrative prompt through a label of general
 338 social surrogacy.

339 We instructed participants to write in detail about each
 340 experience describing events and individuals involved, with
 341 participants being unable to progress to the next part of the
 342 study for two minutes at the start of their writing. Prior to
 343 analysis, written responses underwent manual coding by
 344 researchers to identify whether participants responded to
 345 the prompt appropriately in terms of content with the inten-
 346 tion of placing participants who responded to the control
 347 condition with a discussion of their favorite show in the sur-
 348 rogate condition; no response indicated a need to reassign
 349 participants' conditions. We additionally collected linguistic
 350 data from these responses using the Linguistic Inquiry and
 351 Word Count (LIWC) software to identify potential differ-
 352 ences in linguistic conventions (Tausczik & Pennebaker,
 353 2010). We did not conduct exhaustive analyses in the ser-
 354 vice of minimizing Type I errors, but we found it prudent
 355 to collect such information given its availability.¹

356 Manipulation Checks

357 Following the experimental manipulations, participants
 358 completed various manipulation checks including a single
 359 9-point Likert-type item assessing the extent to which they
 360 felt accepted in the game (1 = *rejected*; 9 = *accepted*;
 361 $M_{Grand} = 5.10$, $SD = 2.73$) and 4 items assessing their mood
 362 along with 9-point scales with higher scores indicating more
 363 positive mood (e.g., 1 = *sad*; 9 = *happy*; $\alpha = .77$; $M_{Grand} =$
 364 6.14, $SD = 1.58$). They further indicated the percentage of
 365 times they were passed the ball from the other two players
 366 along a sliding scale ranging from 0% to 100% ($M_{Grand} =$
 367 27.05%, $SD = 21.82$).

¹ Data from LIWC is available through OSF. A prompt main effect indicated differences in word counts across prompts, $F(1, 528) = 10.25$, $p < .001$, $\eta^2_p = .037$. The surrogate and control prompt did not differ in average word count, but both were significantly higher than for the interactive prompt. [Author: please integrate footnote into main text, if possible]

Proposed Mediators

Below are the proposed mediators for this study.

Basic Needs

Participants reported the satisfaction of their basic needs using a 16-item Basic Needs Questionnaire (Williams et al., 2000). Operating along 9-point Likert-type scales (1 = *not at all*; 9 = *extremely*), these items assessed need satisfaction related to belongingness, self-esteem, control, and meaningful existence (4 items each). For all but belongingness, reliability analyses indicated removal of one item substantially improved the reliabilities of each need, thus prompting us to remove such items from final aggregation ($\alpha > .85$). Basic Needs scores were highly related ($\alpha = .81$), prompting us to average scores into a single outcome ($M_{\text{Grand}} = 6.38$, $SD = 1.66$).

Need to Belong

Participants reported state-level need to belong using a modified version of the trait-level scale (Sacco et al., 2014). This 10-item scale assesses the extent individuals feel motivated to attain social contact along with 7-point scales (1 = *strongly disagree*; 7 = *strongly agree*; $\alpha = .82$; $M_{\text{Grand}} = 4.10$, $SD = 1.08$).

Perceived Vulnerability to Disease

We assessed state-level pathogen-avoidant motives using a modified version of the Perceived Vulnerability to Disease scale (Sacco et al., 2014). This 15-item scale assesses pathogenic concerns on a situation level along with two subscales of perceived infectability that assesses cognitive vigilance toward disease (7 items, $\alpha = 0.83$; $M_{\text{Grand}} = 3.61$, $SD = 1.25$) and germ aversion that assesses an affective avoidance of disease (8 items, $\alpha = 0.68$; $M_{\text{Grand}} = 4.91$, $SD = 1.06$), which operates on 7-point scales (1 = *strongly disagree*; 7 = *strongly agree*).

Social Distancing Deviance

Our critical dependent variable assessed the extent participants currently felt motivated to deviate from recommended social distancing protocols (e.g., going to restaurants, meeting with friends in person) using a 10-item ad hoc measure inspired by items developed by Oosterhoff and Palmer (2020) to assess health-enhancing behaviors through social distancing. This measure operates along with 7-point scales (1 = *strongly disagree*; 7 = *strongly agree*). Higher scores reflected a greater interest in deviating from social distancing; five items required reverse-scoring because they assessed a desire to adhere to social distancing (e.g., shopping online, using Zoom; $\alpha = .86$; $M_{\text{Grand}} = 2.97$, $SD = 1.22$; range: 1–6.33). Table 1 provides a list of all items in this measure.

Results

Manipulation Checks

Our initial analyses were manipulation checks to determine the full extent of the exclusionary experience elicited through Cyberball. We conducted two 2 (Condition: Exclusion vs. Inclusion) \times 3 (Prompt: Surrogacy vs. Control vs. Interaction) analysis of variance (ANOVAs) assessing the extent to which participants felt accepted and their mood. A main effect of Condition for mood indicated that excluded participants reported worse mood ($M = 5.88$, $SD = 1.63$) than did included participants ($M = 6.40$, $SD = 1.48$), $F(1, 528) = 14.73$, $p < .001$, $\eta^2_p = .027$. The Prompt main effect was not significant, nor was the interaction, $F_s < 1.37$, $p_s > .255$, $\eta^2_p s < .006$.

For feelings of acceptance, a Condition main effect indicated excluded participants reported feeling less accepted ($M = 3.51$, $SD = 2.53$) than did included participants ($M = 6.69$, $SD = 1.86$), $F(1, 528) = 275.80$, $p < .001$, $\eta^2_p = .343$. Neither the Prompt main effect nor the interaction was significant, $F_s < 1.80$, $p_s > .165$, $\eta^2_p s < .008$. Excluded participants reported receiving the ball fewer times ($M = 19.60\%$, $SD = 22.65$) than did included participants ($M = 34.50\%$, $SD = 18.15$), $t(532) = 8.39$, $p < .001$, $d = 0.72$, 95% CI [11.41, 18.39].

Because of the lack of effects with prompts, we found it prudent to conduct exploratory analyses with relevant LIWC data to determine whether the surrogacy prompt afforded restorative effects. We considered the number of positive emotion words (e.g., happy, good) used in response to each prompt to see if describing one's favorite television show induced positive language. In a similarly dimensioned ANOVA, a Prompt main effect emerged, $F(1, 528) = 10.57$, $p < .001$, $\eta^2_p = .039$. LSD comparisons indicated participants responding to a social surrogacy ($M = 5.61$, $SD = 4.22$) and interaction prompt ($M = 5.36$, $SD = 3.68$) did not differ in positive language, $p = .543$, $d = 0.08$. Both conditions nonetheless saw more positive language compared to the control condition ($M = 3.81$, $SD = 4.06$), $p_s < .001$, $d_s > 0.39$. The Condition main effect was not significant, nor was the interaction, $F_s < 1.49$, $p_s > .226$, $\eta^2_p s < .007$. This analysis suggests social surrogacy and social interactions elicit similar positive emotional language, which could provide tentative evidence for a successful manipulation.

Preliminary Correlations

We initially conducted a series of bivariate correlations to determine which of our proposed mediators may be predictive of deviating from social distancing guidelines. We thus conducted a series of bivariate correlations considering the need to belong, germ aversion, perceived infectability, and

Table 1. Ad hoc items comprising the deviation scale

Item
If my friends invited me, I would go out to eat at a restaurant right now.
If there was a large party at someone's house today, I would attend.
If I needed to go to the store right now, I'd go by myself. (R)
If I needed to buy something, I'd buy it online rather than go to the store at the moment. (R)
Right now, I would like to go out in public, if only just to stretch my legs.
If a family member or friend invited me over for dinner tonight, I would attend.
If I had a chance to see some friends today, I would recommend we meet on Zoom or Skype instead of in-person. (R)
If given the chance right now, I would like to go socialize outside of my home.
Right now, I would prefer to text friends rather than visit them. (R)
At this very moment, a Zoom call with friends would be preferable to meeting in-person. (R)

Note. Reverse-scored items are denoted by (R).

465 Basic Needs with our deviation measure. Results indicated
 466 that Germ Aversion and Perceived Infectability were both
 467 negatively correlated with a desire to deviate, with the latter
 468 being substantially more predictive. Conversely, the need to
 469 belong positively correlated with this desire; no association
 470 emerged for Basic Needs (for all correlations, see Table 2).

471 Proposed Mediators

472 In our first step of the pre-registered hypotheses to identify
 473 potential bases for interest in deviation as a function of the
 474 experimental manipulations, we conducted a 3 (Prompt:
 475 Surrogate vs. Control vs. Interaction) \times 2 (Condition: Exclusion
 476 vs. Inclusion) multivariate analysis of variance (MAN-
 477 OVA) using Basic Needs Satisfaction, NTB, and state PVD
 478 as outcomes (separate for the germ aversion and perceived
 479 infectability subscales). Neither main effects nor interac-
 480 tions emerged for all outcome variables, $F_s < 3.06$, $p_s >$
 481 $.080$, $\eta^2_{ps} < .007$. We, therefore, considered these variables
 482 no further (see Table 3 for descriptive statistics).

Table 2. Bivariate correlations with the proposed mediators and intentions to deviate from social distancing guidelines

	Basic Needs	NTB	GA	PI	Age
Deviation	-.05	.10*	-.56***	-.14*	-.11*
Basic Needs		-.17**	.01	-.32**	.09*
NTB			.07	.25**	-.06
GA				.25**	.07
PI					-.02

Note: NTB = Need to Belong; GA = Germ Aversion; PI = Perceived Infectability. * $p < .050$; ** $p < .010$.

Primary Analysis

483 We first conducted a 2 (Condition: Exclusion vs. Inclusion)
 484 \times 3 (Prompt: Surrogacy vs. Control vs. Interaction)
 485 ANOVA. Neither main effects were significant, nor did an
 486 interaction emerge, $F_s < 1.86$, $p_s > .285$, $\eta^2_{ps} < .006$. Table 2
 487 provides descriptive statistics for each condition.
 488

Exploratory Analysis

489 Our tentative predictions with age led us to conduct an
 490 exploratory analysis using age as a moderating factor. We
 491 submitted our data to a 2 (Condition: Inclusion vs. Exclu-
 492 sion) \times 3 (Prompt: Surrogacy vs. Control vs. Interaction)
 493 analysis of covariance (ANCOVA) using our previously
 494 defined study variables as the appropriate dimensions while
 495 using Age as a custom covariate to test for interactive
 496 effects between continuous and categorical predictors in a
 497 single omnibus test rather than multiple regression models.
 498 This model affords the opportunity to consider three levels
 499 of a categorical predictor in a single omnibus model with a
 500 continuous predictor not afforded by a regression without
 501 having to rely on dummy codes. An Age main effect
 502 emerged, $F(1, 522) = 6.54$, $p = .011$, $\eta^2_p = .012$; this main
 503 effect indicates older individuals were less likely to deviate
 504 from social distancing guidelines, $r = -.11$, $p = .011$, 95% CI
 505 $[-0.19, -0.02]$. Effects were subsumed by a three-way
 506 Condition \times Prompt \times Age interaction, $F(2, 522) = 3.55$,
 507 $p = .029$, $\eta^2_p = .013$. Figure 1 provides a graphical represen-
 508 tation of findings.
 509

Table 3. Means (standard deviations) for the proposed mediators and primary outcome

	Surrogate		Control		Interaction	
	Inclusion	Exclusion	Inclusion	Exclusion	Inclusion	Exclusion
Basic Needs	6.58 (1.48)	6.26 (1.68)	6.40 (1.71)	6.19 (1.74)	6.53 (1.63)	6.29 (1.73)
NTB	4.09 (1.09)	4.05 (1.03)	3.99 (1.10)	4.22 (1.10)	4.17 (1.14)	4.10 (1.10)
GA	4.92 (1.03)	5.00 (0.96)	4.81 (1.07)	4.93 (1.10)	4.91 (1.12)	4.87 (1.10)
PI	3.79 (1.20)	3.58 (1.41)	3.66 (1.23)	3.48 (1.28)	3.56 (1.24)	3.56 (1.17)
Deviation	2.89 (1.21)	3.18 (1.32)	2.92 (1.24)	2.84 (1.29)	3.03 (1.21)	2.97 (1.06)

Note. NTB = Need to Belong; GA = Germ Aversion; PI = Perceived Infectability.

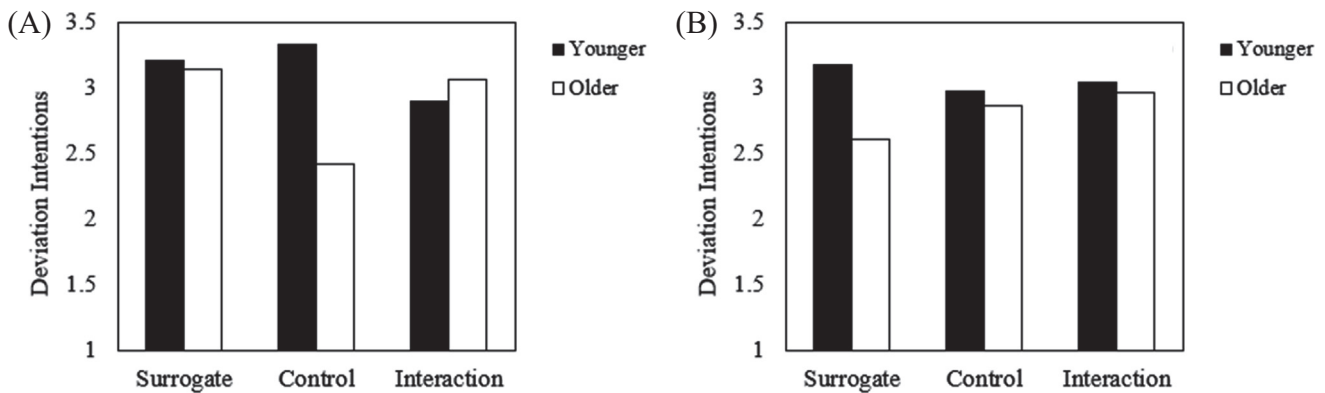


Figure 1. Intentions to deviate from social distancing guidelines among excluded (A) and included (B) participants in younger (-1 SD) and older categories ($+1$ SD) responding to each prompt.

We decomposed this interaction with subordinate regression models using Model 3 of PROCESS (Hayes, 2013). Our specific decomposition was by considering inclusion and exclusion separately from each other using within the same model 10,000 bootstraps. A subordinate two-way interaction did not emerge for Inclusion, prompting no further consideration, $F(2, 522) = 0.95, p = .385, \eta^2_p = .003$.²

Effects for Excluded Participants

Effects for Exclusion were qualified by a subordinate Prompt \times Age interaction, which prompted further decomposition within this model, $F(2, 522) = 4.70, p = .009, \eta^2_p = .017$. Simple slopes analyses indicated a negative association emerged with age for participants responding to the control prompt; older participants reported less interest in deviating from social distancing guidelines, $b = -.04, SE = .01, p < .001, 95\% \text{ CI} [-0.06, -0.02]$. No association with age emerged for excluded participants who wrote about either social surrogacy, $|b| \leq .01, SE = .01, p = .816, 95\% \text{ CI} [-0.03, 0.02]$, or an actual social interaction, $b = .01, SE = .01, p = .533, 95\% \text{ CI} [-0.01, 0.03]$.

To understand this interaction further, we conducted subordinate floodlight analyses by comparing intentions to deviate in the surrogacy condition versus both control conditions at younger (-1 SD; 26.00 years) and older ($+1$ SD; 47.77 years) ages. We used social surrogacy as our reference group for comparisons with both the control and interaction prompts to reduce the number of subordinate analyses conducted. Comparisons originated from the effect coding system provided in PROCESS. When comparing responses to the control and surrogacy prompts for younger adults, no difference emerged, $b = .18, SE = .15, p = .235, 95\% \text{ CI} [-0.12, 0.48]$. For excluded older adults,

participants responding to the surrogacy prompt reported more interest in deviating from social distancing compared to those responding to the control prompt, $b = -.45, SE = .15, p = .002, 95\% \text{ CI} [-0.75, -0.16]$.

When comparing responses to the surrogacy and interaction prompts, no difference emerged for younger adults, $b = -.24, SE = 0.14, p = .082, 95\% \text{ CI} [-0.52, 0.03]$. No difference emerged for older adults with this comparison, $b = .18, SE = .15, p = .234, 95\% \text{ CI} [-0.12, 0.49]$. We conducted an additional pair of analyses using the control prompt as the reference group for comparison with social interactions. Taken together, these comparisons suggest social surrogacy appeared ineffective in fostering social distancing behaviors in young adults and posed a detrimental effect of motivating the intention for social contact among older adults.

Discussion

We found no evidence for a restorative effect from social surrogacy following an exclusionary experience. We found such manipulations were not only ineffective in fostering greater adherence to social distancing guidelines among excluded younger adults but detrimental for excluded older adults' adherence. Excluded older adults were more interested in deviating from social distancing guidelines when prompted with outlets for social surrogacy compared to those who merely wrote about a control experience. This heightened interest in deviating from guidelines could suggest that increasing the salience of social bonds through surrogacy fosters social cravings among older adults, who may be more chronically lonely and less likely to engage

² We provide an exploratory decomposition of this non-significant interaction through OSF. Although included older adults reported less interest in deviance when responding to the social surrogacy prompt, none of the comparisons between conditions across different age categories were significant. The lack of subordinate interaction for the significant simple slope should warrant caution in interpretation. [Author: please integrate footnote into main text, if possible]

in surrogated relationships that could leave them craving interactions more readily when experiencing surrogacy (Hawkey & Cacioppo, 2007; Santini et al., 2020). However, the lack of overall effects within the primary analyses provides little evidence in any direction of whether social surrogacy could itself be an effective intervention to assuage affiliative motives during a pandemic. This suggests additional research based on refinements of the methods in this study.

The unexpected age differences in this study could potentially speak to developmental differences in how social surrogacy impacts behavior. It could be possible that older adults derive fewer benefits from social surrogates compared to younger adults that could produce a backfire effect for the former. Unlike younger adults who could engage more readily with surrogates and derive benefits (Hutteman et al., 2014), it could be possible that surrogacy elicits social cravings among older populations that drive deviation from social distancing. Future research would benefit from specifically identifying developmental trends in the use of social surrogacy across the lifespan. Furthermore, given that the older sample in our study contains individuals likely in different stages of development (i.e., middle-age versus old age), the research could additionally consider the effects of social surrogacy across more carefully defined developmental stages (e.g., Schaie, 2016). As these effects could be driven more readily by younger adults, a study could specifically ask participants to indicate their stage of development and identify whether restorative effects are more common among emerging adults, and determine potential predictors for why they may work (e.g., different life responsibilities). That is, a study could compare more established adult stages with emerging adulthood, a relatively recently conceptualized stage for adults who are working to establish their adult identity (Arnett, 2015).

Proposed Mediator Effects

None of our proposed mediators appeared to be significant mechanisms for these effects. No significant differences emerged between conditions for all four of the measures we utilized in this study, resulting in uncertainty regarding the specific motivations behind excluded older adults' intentions. Although previous work indicates priming manipulations are capable of eliciting state-level differences (e.g., Brown & Sacco, [Author: Please update], in press; Sacco et al., 2014), PVD and NTB are nonetheless originally trait-level measures and may still consider the chronic component of the motives to some degree that could mute our ability to detect state-level differences (McConnell, 2011). The pandemic could have chronically heightened activation of various social motives that would make them more

difficult to modulate through situational factors. Future work could employ measures less derivative of chronic differences that would be more sensitive to state-level changes to determine if these proposed motivational differences are indeed the impetus behind the intentions to deviate (e.g., Brown et al. [Author: Brown, Medlin, et al. or Brown, Sacco, et al. Please update], 2019). This study's completion in late July 2020 could have additionally contributed to the null effects of social surrogacy, perhaps because individuals were already relying extensively on social surrogacy at this stage of the pandemic. Extended reliance could have minimized the momentary efficacy proposed in this study, given that individuals could have been already using surrogacy measures in a prolonged capacity.

Alternatively, the proposed mediators in the current study may not be the mechanisms driving these effects, which could prompt future research to identify the motivational impetus behind the effects. For example, akin to previous findings suggesting that preferences for attractive features are more rooted in aversions to poor health than they are an attraction to good health (Zebrowitz & Rhodes, 2004), a study could employ measures assessing *aversion* to interpersonal contact rather than a desire for it (Brown & Sacco, 2020). It could be possible that interactions become less aversive following exclusion and this lack of aversion could motivate interpersonal contact.

Another possibility for the lack of effects to emerge from our proposed mediators could center around the fact that the current study was conducted during a highly stressful pandemic with which 21st Century Americans would have limited familiarity. A novel stressor would have necessarily increased chronic pathogen concerns to where manipulations were not impactful in shifting state-level motives and therefore precluding us from identifying mediational pathways. Future work could conduct this experiment following a pandemic considering a hypothetical one. Nonetheless, both state-level PVD and NTB sensibly predicted respective (dis)interest in deviation from social distancing guidelines in a capacity indicative of how affiliative and pathogen-avoidant motives operation in opposition to each other (Sacco et al., 2014). These findings further replicate recent work showing an interest in social distancing among those with heightened pathogen avoidance (Brown et al., [Author: Please update], in press; Makhanova & Shepherd, 2020).

Future Directions

Various limitations in the current study emerged that necessitate future directions. Foremost, our primary hypotheses remained unsupported. Although various manipulation checks indicated that exclusionary experiences threatened basic needs, it remains unclear whether social surrogacy

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itself possesses restorative effects in affiliative motives within a pandemic to encourage social distancing beyond our tentative LIWC data. One reason for the prompt manipulation's inability to elicit effects in this study could be rooted in it being relatively outdated from earlier instances of its use (e.g., Derrick et al., 2009). That is, with trends over the past decade leading to people replacing cable television with on-demand streaming services (e.g., Netflix, Hulu) or YouTube as one's primary source of media consumption, the concept of a favorite television show may not resonate as strongly with certain demographics and therefore impede our abilities to find effects. Additionally, the notion of "watching whatever is on TV" may not be as common anymore with more deliberate media consumption instead of channel-surfing in previous decades. Future research would benefit from modifying experimental manipulations to accommodate modern media consumption behaviors (e.g., "binge-watching"). Alternatively, prompt manipulations could have been less sensitive to chronic consumption of media that could have been serving as a social surrogate since the start of the pandemic, with this manipulation not adequately addressing trends. It could be advantageous to consider dispositional media consumption in future research to control for these individual differences.

The associations between the state-level motivations with interest to deviate from social distancing were nonetheless in the expected directions. NTB was associated with heightened interest and both facets of PVD were associated with reduced interest. It could be possible that developing more specific motivational primes could facilitate a more informed understanding of this process and therefore lead to the development of a more effective intervention. The negative association between germ aversion and deviation was particularly large, suggesting activating the affective component of the behavioral immune system could be in encouraging social distancing. Future studies could utilize a disease prime that specifically focuses on aversive motivational states (e.g., pathogen disgust; Tybur et al., 2009) as the basis of fostering social distancing adherence (Brown & Sacco, 2020; Sacco et al., 2014). Additionally, the research could seek to downregulate affiliative motives in other capacities that may not be afforded through Cyberball that is primarily focused on threats to basic needs. Researchers could utilize exclusionary primes that primarily describe an individual seeking affiliative opportunities and either having them met or not in a manner that specifically elicits a change in a desire to belong.

Another basis for why social surrogacy did not improve adherence to social distancing in the current study could be rooted in existing variability through personality among those who engage in social surrogacy. For example, introversion, neuroticism, and insecure attachment are all

associated with utilizing social surrogacy to satisfy affiliative needs (Cole & Leets, 1999; Derrick et al., 2019; Keefer et al., 2012). That is, social surrogacy seems most attractive to those with an overall disinterest in extensive sociality. Future work could consider whether social surrogacy is effective in fostering social distancing among those who are more likely to utilize these relationships to satisfy their affiliative needs. This could be accomplished by identifying individual differences in the relevant, aforementioned Big Five traits and attachment styles. Additionally, a study could assess the degree participants socialized prior to the pandemic to determine whether their deviation may represent a desire to return to the pre-pandemic baseline.

Another consideration for future research is to address additional demographic information. The current study employed a nationally representative sample, but we did not consider the number of restrictions in participants' vicinity that could have duly influenced participants' engagement in social distancing. Subsequent analyses would benefit from considering how different residencies that varied in quarantine regulations could have elicited differences in a desire for socialization. Within these states, individuals could further identify how the salient environmental pathogen load could have influenced responses, given that disease prevalence predicts interpersonal behaviors and the degree to which individuals engage in physical contact (Murray et al., 2017; Schaller & Murray, 2008). Participants' political affiliation could have additionally been critical in determining whether thwarted affiliative motives fostered greater adherence. Given many conservative ideologies were more resistant to social restrictions throughout the pandemic (e.g., Boykin et al., [Author: Please update], in press; Perry et al., 2020), it could have been possible that U.S. conservatives would have been more resistant to social distancing initiatives when their affiliative needs were dissatisfied. Future research could consider these coalitional interests following exclusionary experiences.

Conclusion

The COVID-19 pandemic has created a litany of challenges to curb its proliferation with various measures being taken to encourage social distancing while preventing the deleterious effects of this social isolation. The current study was unable to provide evidence of social surrogacy's utility in these efforts, further demonstrating older adults' heightened noncompliance with guidelines following exclusion. Nonetheless, various aspects of these results may be useful in developing a more complete evolutionary framework for navigating a global pandemic.

These results indicate that more nuanced measures than merely encouraging social surrogacy are needed to overcome the temptation to deviate from social distancing recommendations. Although this finding is not satisfying or necessarily encouraging, we believe there is considerable value in demonstrating that social surrogacy effects have a limited impact on social distancing intentions and may even backfire in older adults. We hope that applied researchers can use these findings as a springboard for follow-up study and as an example of ineffective (but theoretically plausible) interventions to improve social distancing behaviors.

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1049 Authorship

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Open Data

Data, materials, and the pre-registration plan are available at:
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