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Intergenerational conflicts of interest and prosocial behavior during the COVID-19 pandemic☆

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ABSTRACT

The COVID-19 pandemic presents threats, such as severe disease and economic hardship, to people of different ages. These threats can also be experienced asymmetrically across age groups, which could lead to generational differences in behavioral responses to reduce the spread of the disease. We report a survey conducted across 56 societies ($N = 58{,}641$), and tested pre-registered hypotheses about how age relates to (a) perceived personal costs during the pandemic, (b) prosocial COVID-19 responses (e.g., social distancing), and (c) support for behavioral regulations (e.g., mandatory quarantine, vaccination). We further tested whether the relation between age and prosocial COVID-19 responses can be explained by perceived personal costs during the pandemic. Overall, we found that older people perceived more costs of contracting the virus, but less costs in daily life due to the pandemic. However, age displayed no clear, robust associations with prosocial COVID-19 responses and support for behavioral regulations. We discuss the implications of this work for understanding the potential intergenerational conflicts of interest that could occur during the COVID-19 pandemic.

The COVID-19 pandemic has imposed large-scale social, economic, and personal costs on the global population. To cope with these challenges and alleviate the negative consequences of the pandemic, social scientists have applied different theories to understand and recommend policies to manage the pandemic (Van Bavel et al., 2020; West et al., 2020). One of these perspectives is that the behaviors required to manage the pandemic pose a social dilemma, whereby individual short-term self-interests are at odds with longer-term collective interests (Johnson et al., 2020; Ling & Ho, 2020).

Indeed, many of the behaviors that are known to be effective in reducing the transmission of the virus (e.g., social distancing) involve a tradeoff between self and collective interests, requiring people to bear individual costs to benefit others (Van Lange et al., 2013). Prosocial behaviors during the pandemic present a range of notable costs to individuals, from disrupting daily plans, to loneliness and economic hardship. Yet, these same behaviors offer benefits of protecting individuals from exposure to the virus, reducing the spread of the virus, and maintaining well-functioning health care institutions. While such prosocial behaviors might lead to collective benefits, it can be important to recognize that the costs and benefits of these behaviors can vary dramatically across individuals.

Age could be a demographic characteristic that relates to variation in the perceived costs and benefits of prosocial behaviors aimed to reduce the spread of the virus. In this paper, we advance and test pre-registered predictions about how age may be positively associated with prosocial motivations (e.g., willingness to engage in self-sacrifices to prevent the

☆ The data can be accessed via the Center for Open Science repository at the following link: https://osf.io/bgvk7/

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spread of COVID-19) and actual prosocial behaviors during the pandemic (e.g., social distancing) – which can be considered first-order cooperation in response to a social dilemma. We further hypothesize that age may also be positively associated with support for behavioral regulations to manage the pandemic (e.g., support for mandatory quarantine) – a type of second-order cooperation in support of institutions to solve the social dilemma. We evaluate these hypotheses with multi-level models, utilizing participant-level data from a large-scale cross-societal study to examine potential association between age and COVID-19 responses.

1.1. COVID-19 pandemic, social dilemmas, and cooperation

Many of the behaviors required to reduce the spread of COVID-19 can involve a conflict of interests between what is best for individuals and what is best for the collective (i.e., a social dilemma; Dawes, 1980; Spadaro et al., 2020). In social dilemmas, people can make costly prosocial behaviors to benefit the collective, and indeed, the collective receives a better outcome when each person engages in cooperation. However, people may face a temptation to not engage in costly cooperation, but to free-ride on the benefits received from others' cooperation. The worst possible outcome for an individual is experienced when he/she cooperates, but everyone else decides not to cooperate. Social distancing, self-quarantine, vaccination have each been considered to involve this kind of conflict between individual and collective benefits (Johnson et al., 2020; Korn et al., 2020).

Decades of research has focused on how people behave when experiencing a social dilemma – that is, first-order cooperation in the dilemma (Van Lange et al., 2014). This work has found that cooperation can be promoted in social dilemmas when institutions are implemented to monitor and sanction behaviors (Fehr & Gächter, 2002; Kerkhoff et al., 2020; Ostrom, 1990; Yamagishi, 1988a). Yet, the establishment and maintenance of these institutions are costly and pose a second-order dilemma. Therefore, it is also important to study the support for institutions to solve the social dilemma – a type of second-order cooperation in response to a social dilemma (Yamagishi, 1986).

A robust finding in cooperation research is that people are less inclined to cooperate when the costs of cooperation are high, and the benefits to the collective are low (Deutsch, 1949; Ledyard, 1995; Olson, 1965). Stated differently, people are less cooperative in situations that involve a stronger conflict of interests (Balliet & Van Lange, 2013; Komorita et al., 1980; Rapoport, 1967). Furthermore, people tend to display more support for institutions to regulate others' behavior when experiencing a stronger conflict of interests (Yamagishi, 1988b). During the COVID-19 pandemic, the costs associated with the behaviors required to manage the pandemic may vary across individuals, and therefore lead to different responses to the pandemic.

1.2. Age and perceived costs during the COVID-19 pandemic

The COVID-19 pandemic may pose different costs and benefits to people from different generations, which may create a situation where younger and older people perceive asymmetric conflict of interests in engaging in costly prosocial behaviors (e.g., social distancing) during the pandemic. For example, the elderly are facing higher costs associated with contracting the virus due to a higher probability of severe diseases (Kluge, 2020; Liu et al., 2020) and higher fatality rate (Kang & Jung, 2020; Wu & McGoogan, 2020) following infection. For these reasons, older adults may experience greater benefits from costly prosocial behaviors to curb the spread of the virus, including a reduced chance of contracting COVID-19 and the maintenance of a well-functioning health care institution, which they may personally need to treat diseases. Therefore, we expect that older individuals, compared to younger ones, will report higher perceived costs associated with contracting COVID-19 (H1a).

Younger people, on the other hand, may experience higher costs associated with disruptions to their daily life routines, stronger costs of cancelling their social events, and even experience relatively larger economic losses. This is quite a different situation compared to older generations, many of whom may be retired and/or receive government support as a stable income. Indeed, a recent survey across Europe found that younger people were more strongly negatively affected by the initial lockdown, with younger people reporting less happiness, life satisfaction, and mental well-being, and less optimism about their financial situation (Eurofound, 2020). We hypothesize that younger, compared to older, people would perceive higher costs in daily life due to the pandemic (e.g., increased struggles in daily life), including costs associated with making changes in their lives (e.g., cancelling plans) during the pandemic (H1b).

1.3. Age and cooperation during the pandemic

Any age-related difference in the costs and benefits of prosocial behaviors to manage the pandemic (e.g., social distancing) could translate into age-related differences in responses to the pandemic. If older people perceive less costs (and more benefits) associated with making prosocial behaviors to constrain the spread of the virus, they would be predicted to display higher prosocial motivations towards others and engage in more prosocial behaviors than younger people (H2a). Furthermore, for the same reasons, older people may be more inclined to support behavioral regulations to address COVID-19 (H2b).

Importantly, past research has been inconsistent about whether age is associated with cooperation and prosocial behavior. Some previous research has found that older people are more prosocial in economic games (Matsumoto et al., 2016; Van Lange et al., 1997). Yet, other studies found no relation between age and prosocial behavior (Feldman, 2010; Rooney et al., 2001), or mixed evidence across different economic games (Romano et al., in press). Nonetheless, age may be associated with prosocial behavior in response to the pandemic, because of asymmetries in the perceived costs of these behaviors, which can affect conflicting interests and prosocial behavior (Columbus et al., 2020). In this study, we therefore test a mediation model whereby the positive associations between age and prosocial COVID-19 responses (i.e., prosocial motivations and behaviors) and support for COVID-19 behavioral regulations are mediated, in part, by the perceived costs of contracting COVID-19 and disruptions to one's lifestyle (H3).

2. Methods

2.1. Participants

We used participant-level data collected from the baseline of the PsyCorona Study, a cross-societal longitudinal study on individual responses to COVID-19 (https://psycorona.org/). The research was approved by the Ethics Committees of the University of Groningen (PSY-1920-S-0390) and New York University Abu Dhabi (HRPP-2020-42). Prior to acquiring the data, the study proposal and analyses plan were pre-registered on OSF (https://osf.io/dvf3w, see Supplementary information for deviations from pre-registration). Participants were recruited following a combination of convenience and representative sampling strategies and completed the survey in 1 out of 30 possible languages. The initial sample consisted of 59,220 participants from 99 societies who participated between March 19th and May 17th 2020. Societies with less than 30 observations or not identifiable were excluded, which resulted in a final sample of participants ($N = 58{,}641$) from 56 societies (see Table 1). Of the final sample, 60.9% were female and 38.3% were male (193 did not report gender). Age was assessed in eight cohorts, with 22.3% participants age 18 to 24, 24.3% age 25–34, 19.3% age 35–44, 14.3% age 45–54, 11.4% age 55–64, 7.0% age 65–75, 0.9% age 75–85, and 0.1% older than 85 (225 did not report age).

Table 1
Societies, sample sizes, and descriptive statistics of participants included in the analyses.

Society	*N*	% Females	% age range							
			18–24	25–34	35–44	45–54	55–64	65–75	75–85	85+
Algeria	200	37%	13%	38%	41%	7%	2%	1%	0%	0%
Argentina	1407	57%	17%	25%	17%	14%	20%	6%	1%	0%
Australia	1200	53%	12%	18%	19%	19%	16%	13%	3%	0%
Austria	49	59%	6%	53%	24%	14%	2%	0%	0%	0%
Bangladesh	154	29%	47%	40%	3%	6%	1%	1%	1%	0%
Belgium	61	80%	16%	34%	28%	8%	8%	3%	0%	0%
Brazil	1381	57%	16%	23%	20%	18%	14%	8%	1%	0%
Canada	1514	58%	16%	22%	18%	17%	14%	10%	2%	0%
Chile	317	75%	15%	34%	25%	14%	9%	3%	0%	0%
China	388	65%	30%	39%	20%	6%	2%	0%	0%	0%
Colombia	43	70%	7%	37%	23%	16%	14%	2%	0%	0%
Croatia	353	80%	39%	34%	13%	9%	4%	1%	0%	0%
Cyprus	69	75%	14%	26%	25%	32%	1%	1%	0%	0%
Egypt	848	85%	84%	10%	3%	1%	0%	0%	0%	0%
El Salvador	44	64%	77%	16%	2%	5%	0%	0%	0%	0%
France	1788	58%	11%	21%	18%	17%	15%	16%	2%	0%
Germany	1669	56%	12%	22%	16%	17%	15%	15%	2%	0%
Greece	2832	67%	24%	18%	20%	18%	16%	4%	0%	0%
Hong Kong S.A.R.	234	65%	49%	18%	17%	9%	4%	1%	0%	0%
Hungary	442	83%	58%	20%	9%	6%	4%	2%	0%	0%
India	90	46%	27%	46%	13%	9%	3%	0%	0%	0%
Indonesia	2398	51%	36%	24%	17%	13%	7%	2%	0%	0%
Iraq	32	38%	31%	25%	9%	16%	13%	6%	0%	0%
Israel	76	74%	14%	28%	26%	16%	7%	5%	3%	0%
Italy	1985	60%	23%	21%	15%	13%	12%	14%	2%	0%
Japan	1324	47%	23%	14%	14%	14%	15%	18%	2%	0%
Kazakhstan	808	56%	12%	39%	31%	13%	3%	0%	0%	0%
Kosovo	339	81%	57%	18%	17%	6%	1%	0%	0%	0%
Malaysia	888	70%	17%	38%	23%	13%	5%	2%	0%	0%
Mexico	38	79%	3%	39%	18%	18%	13%	5%	3%	0%
Morocco	41	32%	24%	39%	12%	17%	5%	2%	0%	0%
Netherlands	2344	62%	15%	25%	18%	16%	14%	10%	2%	0%
Pakistan	212	70%	59%	25%	8%	7%	0%	0%	0%	0%
Peru	123	65%	26%	35%	28%	4%	2%	3%	0%	0%
Philippines	1525	56%	26%	28%	19%	14%	10%	3%	0%	0%
Poland	712	82%	35%	25%	20%	11%	5%	3%	0%	0%
Portugal	46	78%	7%	30%	22%	22%	13%	7%	0%	0%
Republic of Serbia	2114	66%	23%	21%	19%	15%	15%	6%	0%	0%
Romania	2694	61%	44%	17%	14%	11%	7%	6%	1%	0%
Russia	1430	61%	10%	25%	21%	16%	15%	13%	1%	0%
Saudi Arabia	1462	53%	29%	28%	23%	13%	5%	0%	0%	0%
Singapore	244	71%	59%	19%	9%	9%	3%	0%	0%	0%
South Africa	1403	56%	18%	25%	19%	15%	16%	6%	1%	0%
South Korea	1370	57%	32%	17%	19%	14%	9%	8%	1%	0%
Spain	3189	63%	15%	21%	22%	20%	13%	7%	1%	0%
Sweden	70	69%	3%	49%	21%	16%	3%	6%	1%	0%
Switzerland	57	56%	7%	32%	40%	11%	4%	2%	0%	0%
Taiwan	164	70%	41%	21%	23%	12%	1%	1%	0%	0%
Thailand	155	58%	14%	50%	25%	8%	2%	1%	0%	0%
Tunisia	67	36%	10%	31%	22%	25%	9%	1%	0%	0%
Turkey	1819	60%	20%	27%	21%	15%	11%	5%	1%	0%
Ukraine	1430	60%	14%	24%	22%	16%	19%	5%	0%	0%
United Arab Emirates	88	67%	27%	30%	25%	11%	6%	0%	0%	0%
United Kingdom	1892	61%	15%	19%	17%	15%	14%	15%	4%	0%
United States of America	10,776	62%	15%	30%	23%	14%	11%	6%	1%	0%
Vietnam	243	76%	71%	18%	8%	1%	0%	0%	0%	0%
Number in total	58,641	35,714	13,096	14,260	11,304	8400	6661	4089	543	63

Notes. *N* = Sample size for each society. Percentages might not add up to 100% due to rounding and missing data in reporting age and gender. The survey presented the option to indicate that the participant was above 85 years old, but percentages of this age category appeared to be 0% due to rounding. See Number in total for frequencies of each age category.

2.2. Measures

2.2.1. Outcome variables

2.2.1.1. Prosocial COVID-19 motivations. To measure prosocial motivations, we used a set of 4 items where participants stated their agreement about their willingness to (1) help others, (2) make donations, (3) protect vulnerable groups, and (4) make sacrifices to deal with COVID-19 pandemic on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*, $\alpha = 0.77$).

2.2.1.2. Prosocial COVID-19 behaviors. Two operationalizations of prosocial behaviors were implemented. One measure was an average score from three prosocial behavior items, in which people were asked about their agreement on social distancing behaviors (i.e., self-isolation, avoidance of public spaces) and health prevention (i.e., washing hands) to minimize their chances of getting COVID-19 on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*, $\alpha = 0.74$). The other measure was a single-item reflecting the extent to which participants reported leaving their home in the past week, using a 4-point scale (1 = *I did not leave my home*, 2 = *once or twice*, 3 = *three times*, 4 = *four times or more*),

which was reverse-scored (i.e., staying at home behavior).

2.2.1.3. Support for behavioral regulations. We assessed people's support for behavioral regulations aimed at curbing COVID-19 by aggregating responses to three items about whether participants would sign petitions to enforce compliant behaviors to reduce the spread of COVID-19 (i.e., support for mandatory vaccination, for mandatory quarantine to people exposed to the virus, for reporting people who are suspected to be infected). Items were rated on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*, α = 0.71, see SI).

2.2.2. Mediators

2.2.2.1. Perceived costs of contracting the virus. To measure the perceived personal costs of contracting the virus, participants were asked to what extent they felt disturbed by the consequences of contracting the virus on a 5-point Likert scale (1 = *not disturbing at all*, 5 = *extremely disturbing*).

2.2.2.2. Perceived costs in daily life due to the pandemic. We used a set of 3 items that asked people to what extent they felt disturbed by the consequences of the coronavirus (i.e., suffering negative economic consequences, cancellation of plans, changing life routines) on a 5-point Likert scale (1 = *not disturbing at all*, 5 = *extremely disturbing*). Another item was included to describe the agreement on increased struggles in daily life caused by recent events in society, using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). These four items were aggregated to represent the perceived costs in daily life due to the pandemic (α = 0.66).

2.2.2.3. Loneliness. Loneliness was assessed by asking participants how often they felt (1) lonely, (2) isolated from others, and (3) left out during the past week, on a 5-point Likert scale (1 = *never*, 5 = *always*, α = 0.82).

2.2.2.4. Job insecurity. A set of four items were used to measure job insecurity by asking participants' agreement on (1) losing their job soon, (2) keeping the job (reversed item), (3) insecure about the future of their job, and (4) whether they already lost their job, on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*, see SI, α = 0.82). Participants could answer with not applicable if the item was not suitable to describe their situation.

2.2.3. Control variables

2.2.3.1. Perceived COVID-19 risk (individual level). Perceived risk was measured by asking respondents the likelihood of getting infected with coronavirus on an 8-point Likert scale (1 = *not at all*, 8 = *already happened*).

2.2.3.2. Perceived stringency of policies (individual level). We used two items to assess perceived stringency of policies by asking people to what extent their community was applying strict rules to regulate behaviors to reduce the spread of COVID-19 (i.e., developing strict rules in response to the Coronavirus; punishing people who deviate from the rules that have been put in place in response to the Coronavirus) on a 6-point Likert scale (1 = *not at all*, 6 = *very much*, α = 0.72).

2.2.3.3. Stringency of policies (societal level). Societal level stringency of policies was operationalized as the maximum level of stringent measures a government has taken in response to the COVID-19 outbreak to May 17th 2020, extracted from Oxford COVID-19 Government Response Tracker (OxCGRT; Hale et al., 2020).

2.2.3.4. Severity of the pandemic (societal level). Societal level severity of the pandemic was operationalized as the total number of deaths per million to May 17th 2020 (European Center for Disease Prevention and Control; ECDC, see SI).

2.3. Analytic strategy

We pre-registered analyses using multilevel models, with participants (level-1) nested within societies (level-2). These models account for differences across societies using random intercepts. We estimated separate models to examine the main effect of age on perceived personal costs (H1a/b), prosocial COVID-19 motivations and behaviors (H2a), support for behavioral regulations (H2b), as well as the effect of perceived personal costs on prosocial COVID-19 responses and support for regulations. We also performed multilevel mediation models for testing the hypothesized mediators of different types of perceived costs (H3). All models included perceived COVID-19 risk, perceived (and actual) stringency of policies, and severity of the pandemic as relevant controls. Furthermore, we examined the hypothesized correlations within each society, and applied random effects meta-analyses of these correlations to estimate the population level effect size (i.e., *r*).

3. Results

3.1. Age and perceived costs of the pandemic

We first tested whether participants' perceived personal costs during the COVID-19 pandemic varied across age (H1a/b, see SI for descriptive statistics). As expected, we found that age was positively correlated with perceived costs of contracting the virus ($b = 0.097$, $p < .001$; meta-analytic estimate: $r = 0.105$, *95% CI* [0.082, 0.129]), but negatively correlated with perceived costs in daily life ($b = -0.031$, $p < .001$; $r = -0.049$, *95% CI* [−0.075, −0.023]). In line with H1a/b, these results support that older, compared to younger, people perceive higher costs of contracting the virus, but less costs in daily life due to the pandemic. Moreover, we found that age was negatively associated with loneliness ($b = -0.100$, $p < .001$; $r = -0.155$, *95% CI* [−0.179, −0.131]) and job insecurity ($b = -0.036$, $p < .001$; $r = -0.067$, *95% CI* [−0.096, −0.037], see Table 2 and SI).

3.2. Age and prosocial COVID-19 responses

The second objective of the present study was to examine age differences in prosocial responses during the COVID-19 pandemic (i.e.,

Table 2
Mixed-effect models of age predicting COVID-19 responses and perceived costs during the COVID-19 pandemic.

Outcome variables	Age				
	N	*b*	*SE*	*t*	*p*
COVID-19 responses					
Prosocial COVID-19 motivations	58,071	−0.019	0.003	−6.216	<0.001
Prosocial COVID-19 behaviors	58,085	0.004	0.003	1.508	0.132
Staying at home behavior	58,159	−0.037	0.003	−13.737	<0.001
Support for behavioral regulations	58,080	0.002	0.003	0.653	0.514
Perceived costs					
Costs of contracting the virus	58,074	0.097	0.003	29.863	<0.001
Costs in daily life due to the pandemic	58,017	−0.031	0.002	−14.078	<0.001
Loneliness	58,085	−0.100	0.003	−37.591	<0.001
Job insecurity	36,784	−0.036	0.004	−9.914	<0.001

Notes. Individual level and societal level control variables were included in each model (i.e., perceived COVID-19 risk, perceived stringency of policies, stringency of policies, severity of the pandemic). *N* = the number of participants included in the analyses.

prosocial motivations, prosocial behaviors, support for behavioral regulations, see SI for descriptive statistics). Overall, we found no support for the hypotheses that age would be positively related to prosocial behaviors (p = .132; r = 0.005, *95% CI* [−0.022, 0.031], H2b), and support for behavioral regulations (p = .514; r = −0.009, *95% CI* [−0.036, 0.017], H3). Age was negatively related to prosocial COVID-19 motivations in the mixed-effect model (b = −0.019, p < .001). Yet, this negative association was non-significant while examining the population level effect size across societies (r = −0.008, *95% CI* [−0.031, 0.015]). We found a negative association between age and staying at home behavior (b = −0.037, p < .001; r = −0.079, *95% CI* [−0.107, −0.052], see Table 2 and SI). Nonetheless, these data clearly failed to support the hypotheses that age would be positively associated with prosocial motivations and behaviors (H2a/b; see Table 3).

3.3. Perceived costs and prosocial COVID-19 responses

Next, we examined the association between different types of perceived personal costs and prosocial COVID-19 responses (see Table 4 and SI). In summary, we found that perceived costs of contracting the virus were positively correlated with prosocial behaviors (b = 0.189, p < .001), staying at home behavior (b = 0.049, p < .001), and support for behavioral regulations (b = 0.258, p < .001), but had no significant relationship with prosocial motivations (p = .546). Perceived costs in daily life due to the pandemic were found to positively relate to prosocial behaviors (b = 0.082, p < .001) and support for behavioral regulations (b = 0.155, p < .001), but had no significant association with staying at home behavior (p = .145), and was even negatively correlated with prosocial motivations (b = −0.055, p < .001). Loneliness had a small negative association with prosocial motivations (b = −0.049, p < .001) and prosocial behaviors (b = −0.012, p = .003), but had a positive correlation with staying at home behavior (b = 0.079, p < .001) and support for regulations (b = 0.040, p < .001). Job insecurity was associated with lower prosocial motivations (b = −0.149, p < .001), less prosocial behaviors (b = −0.070, p < .001) and support for regulations (b = −0.048, p < .001), but was positively associated with more staying at home behavior (b = 0.125, p < .001). Therefore, individual differences in these perceived costs were associated with prosocial responses to the pandemic.

3.4. Mediational role of perceived costs

Though we did not find support for H2a/b, we explored whether the negative associations between age and two prosocial responses (i.e., prosocial motivations, staying at home behavior) were mediated by different types of perceived costs during the pandemic, applying causal mediation analysis of multilevel data using the *mediation* package in R (Tingley et al., 2014), and the quasi-Bayesian Monte Carlo method was used for uncertainty estimates (set.seed = 30, sims = 1000, see SI).

First, we tested whether perceived costs mediate the negative relationship between age and prosocial motivations (or staying at home behavior, see SI). Many of the direct effects were small but statistically significant (ADEs <0.10, see SI). An examination of the indirect effects showed that the relation between age and prosocial motivations was partially mediated by perceived costs in daily life due to the pandemic (*ACME* = 0.002, *95% CI* [0.002, 0.003]) and loneliness (*ACME* = 0.007, *95% CI* [0.006, 0.008]), and fully mediated by job insecurity (*ACME* = 0.006, *95% CI* [0.005, 0.007]). Furthermore, the effect of age on staying at home behavior was partially mediated by perceived costs of contracting the virus (*ACME* = 0.008, *95% CI* [0.007, 0.009]), loneliness (*ACME* = −0.011, *95% CI* [−0.012, −0.010]) and job insecurity (*ACME* = −0.006, *95% CI* [−0.007, −0.005]). In sum, although these findings are inconsistent with H3, we found that different perceived costs during the pandemic explained, in part, why older adults had less prosocial COVID-19 motivations, and were less often staying at home during the pandemic.

Table 3
Overview of the support for the pre-registered hypotheses.

#	Hypothesis	Support
1a	Older compared to younger people will report higher perceived costs associated with contracting COVID-19.	Yes
1b	Younger compared to older people will report higher perceived costs associated with the pandemic (e.g. increased struggles in daily life), as well as making changes in their life (e.g. cancelling plans).	Yes
2a	Older compared to younger people will have higher prosocial motivations towards others and engage in more prosocial behaviors.	
	Motivations	No
	Behaviors	No
2b	Older compared to younger people will be more willing to support behavioral regulations to deal with COVID-19.	No
3	The positive association between age and prosocial behavior (and support for regulations to deal with COVID-19) will be mediated by perceived costs of contracting COVID-19 and disruptions to one's lifestyle.	No

3.5. Robustness checks and exploratory analyses

We performed two additional analyses that were not pre-registered to test whether our results were robust across different samples and measurements and to explore a potential nonlinear relation between age and prosocial COVID-19 responses. First, we tested our hypotheses using a different global COVID-19 dataset including individual COVID-19 responses collected during a similar timeframe (between March 20th and April 8th 2020, Fetzer et al., 2020). The survey was based on answers to a questionnaire available in 69 languages from 113,115 participants across more than 170 societies, recruited through snowball sampling. Importantly, age was recorded using exact age instead of age categories. We retrieved three items that measured similar prosocial COVID-19 behaviors (i.e., "I stayed at home", "I washed my hands more frequently than the month before", "I did not attend social gatherings"). Participants were asked the extent to which these three statements described their behavior in the past week (0 = *does not apply*, 100 = *apply very much*). Age had a statistically significant positive correlation with prosocial COVID-19 behavior in the mixed effect model (b = 0.491, p < .001), but was not associated with prosocial behaviors according to the meta-analytic estimate (r = 0.013, *95% CI* [−0.002, 0.027], see SI). Therefore, in this alternative dataset, we found no consistent evidence in support of the hypothesis that older people are more likely to engage in prosocial behaviors in response to the pandemic.

Second, we used a mixed model nested ANOVA to explore whether the different age categories had a non-linear relation with prosocial COVID-19 responses and support for behavioral regulations. Society was included as a random factor. We integrated the three older age cohorts (i.e., 65–75, 75–85, and >85) into a single age category. This enabled a more balanced sample size across the different age groups. Age had statistically significant, but small effects, on prosocial COVID-19 motivations and behaviors, and support for behavioral regulations (Δ marginal R^2s = 0.001–0.014, Δ conditional R^2s = 0–0.011, ps < 0.001). Moreover, the graphical representations of partial effects showed nonlinear patterns of age effects on prosocial COVID-19 responses (see SI). Specifically, the pairwise comparisons between age categories revealed that both the youngest and oldest age groups were more likely to engage in prosocial COVID-19 behaviors and support behavioral regulations, compared to middle-aged people. However, we found the opposite pattern for prosocial COVID-19 motivations, with middle-aged people being more prosocial than both their older and younger counterparts (e.g., 18–24 vs 35–44, 45–54 vs >65, ps < 0.05, |Cohen's d| = 0.027–0.175, see SI). Therefore, we did find some evidence in support of a nonlinear relation between age and COVID-19 responses in this exploratory analysis.

Table 4
Mixed-effect models of perceived costs predicting COVID-19 responses.

Outcome variables	Costs of contracting the virus		Costs in daily life due to the pandemic		Loneliness		Job insecurity	
	b	*p*	*b*	*p*	*b*	*p*	*b*	*p*
Prosocial COVID-19 motivations	0.002	0.546	−0.055	<0.001	−0.049	<0.001	−0.149	<0.001
Prosocial COVID-19 behaviors	0.189	<0.001	0.082	<0.001	−0.012	0.003	−0.070	<0.001
Staying at home behavior	0.049	<0.001	−0.007	0.145	0.079	<0.001	0.125	<0.001
Support for behavioral regulations	0.258	<0.001	0.155	<0.001	0.040	<0.001	−0.048	<0.001

Notes. Individual level and societal level control variables were included in each model. See SI for full table with varying number of participants included in each model.

4. Discussion

The present research tested pre-registered hypotheses about age-related differences in first order cooperation in response to the pandemic (i.e., prosocial COVID-19 motivations and behaviors) and second-order cooperation for institutional solutions to address the pandemic (i.e., support for behavioral regulations to tackle COVID-19). We derived our hypotheses from the perspective that many of the behaviors to suppress the spread of COVID-19 pose a social dilemma, whereby individual short-term self-interests are at odds with long-term collective benefits (Johnson et al., 2020; Van Bavel et al., 2020). We suggested that age may be related to the costs of these prosocial behaviors (e.g., social distancing), and that younger, compared to older, people would experience a stronger conflict of interests engaging in these prosocial behaviors. Results supported the hypothesis that age is indeed positively associated with perceived costs of contracting the virus, but negatively correlated with perceived costs in daily life due to the pandemic, including loneliness and job insecurity. However, we did not find consistent evidence to support the hypotheses that older people would display more prosocial COVID-19 motivations and behaviors, and support for behavioral regulations.

Our work answers recent calls to study the psychological consequences of COVID-19 for younger and older people, which may affect their compliance to the precautionary measures and behaviors to limit the spread of COVID-19 (Banerjee, 2020; Petretto & Pili, 2020). We indeed found age-related differences in how people report being affected by the COVID-19 pandemic. Around the world, older people perceived higher costs of contracting COVID-19, which demonstrates that older people are aware of the higher risks associated with infection. On the other hand, younger people perceived higher costs of making contributions to tackle COVID-19, including higher loneliness and perceived costs, in general, in daily life due to the pandemic. In the current study, younger people also reported higher job insecurity, which implies that older generations experience relatively less economic hardship as a result of the pandemic. These findings were replicated in a survey study from the European Union which found that younger generations, relative to older generations, faced more hardship in daily life due the pandemic (Eurofound, 2020).

Although we found that age was associated with higher perceived costs of contracting the virus, and less disruptions in daily life, we did not find consistent evidence showing age-related differences in responses to the pandemic. Importantly, we found no substantial relation between age and prosocial COVID-19 motivations. Age was also not associated with prosocial COVID-19 behaviors or support for behavioral regulations to address the pandemic. Contrary to our prediction, older people reported staying at home less often. We tested this hypothesis using a different cross-societal survey and found that age was not associated with prosocial COVID-19 behaviors. When we removed the assumption of linearity, then age explained a small proportion of variability in prosocial COVID-19 responses and support for behavioral regulations. Interestingly, while both the youngest and oldest age groups seemed relatively more likely to engage in prosocial COVID-19 behaviors (and also support behavioral regulations) compared to middle-aged people, this pattern was exactly the opposite for prosocial COVID-19 motivations. Taken together, these results question the existence of any meaningful, substantive association between age and either first-order or second-order cooperation in response to the pandemic – at least during the early stages of the pandemic.

We offer three possible explanations for these findings. First, people's responses to the pandemic may be shaped by the motive of self-interest instead of concern for collective interest (Miller, 2001). In fact, the items assessing prosocial COVID-19 behaviors explicitly framed the behaviors as being motivated by self-interest (i.e., "to minimize my chances of getting coronavirus, I…", see SI). People may stay at home and maintain social distancing because their *behavioral immune system* is activated by inferences about their risks of infection (Schaller, 2011), and so to promote their own survival. Second, people may not realize their interdependence with societal members during the pandemic. Here, we suggested possible age-related differences in the degree of conflicting interests. However, another dimension of interdependence is the degree of mutual dependence, that is the extent to which people's outcomes in a situation depend on how each person behaves (Gerpott et al., 2018). If people perceive their outcomes from engaging in these prosocial behaviors as being totally independent from how others behave, then people would not perceive any conflicting interests between themselves and others. Third, age-related differences in time discounting could offset any age-related differences in the relation between perceived costs and prosocial behaviors during the pandemic. Time discounting is known to more strongly affect decision making in older people (Read & Read, 2004). In the case of the COVID-19 pandemic, the immediate benefits from social interactions may be more tempting to those who prefer more immediate gratification, which could in turn lead to non-compliance to the precautionary measures.

There are a few strengths and limitations of the present work worth mentioning. First, we used a large cross-cultural sample to test our hypotheses, which offer sufficient statistical power (Bakker et al., 2012). Though this is a strength of the current study, it's important to bear in mind that the meta-analytic associations were small effect sizes ($|r| =$ 0.01–0.16). Another strength is that we tested hypotheses of first-order and second-order cooperation using multiple operationalizations of these constructs. Yet, this study relied on self-reported items to study people's responses, which can be susceptible to socially desirable responding (Arnold & Feldman, 1981). Third, we measured various types of perceived costs that were directly extracted from people's life during the pandemic. Further research might additionally use scales to capture people's perceptions of their interdependence with others during the pandemic (Gerpott et al., 2018). Finally, our conclusions are limited to the initial stage of the pandemic, and future work may continue to evaluate how age is associated with these behaviors as the pandemic continues.

Recently, public discussions have occurred about possible age-related differences in behavioral responses to the pandemic (Bahrampour, 2020; Pancevski et al., 2020). Pictures of young people partying on the beach have caused outrage and stoked ideas that the youth are less inclined to follow guidelines. Yet, news circulates that older people are also flaunting the rules, disobeying guidelines, often to the dismay of their middle-aged children. We found no consistent support for our hypothesis that age has a clear, robust association with prosocial

motivations and behaviors, or support for behavioral regulations during the early stages of the pandemic. We did, however, find age-related differences in the perceived costs of the pandemic, either by contracting the virus, or social and economic costs. Moreover, individual differences in these perceived costs did predict who was more willing and likely to engage in prosocial behaviors. Therefore, policies aimed at changing others behaviors may usefully target people experiencing higher perceived personal costs as a result of the pandemic.

CRediT authorship contribution statement

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Appendix A. Supplementary data

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References

Arnold, H. J., & Feldman, D. C. (1981). Social desirability response bias in self-report choice situations. *Academy of Management Journal, 24*(2), 377–385. https://doi.org/10.5465/255848.

Bahrampour, T. (2020, June 11). *As the pandemic surges, old people alarm their adult kids by playing bridge and getting haircuts*. The Washington Post. https://www.washingtonpost.com/local/social-issues/as-the-pandemic-surges-old-people-alarm-their-kids-by-playing-bridge-and-getting-haircuts/2020/07/10/e10aa6e8-bd7b-11ea-bdaf-a129f921026f_story.html.

Bakker, M., van Dijk, A., & Wicherts, J. M. (2012). The rules of the game called psychological science. *Perspectives on Psychological Science, 7*(6), 543–554. https://doi.org/10.1177/1745691612459060.

Balliet, D., & Van Lange, P. A. M. (2013). Trust, conflict, and cooperation: A meta-analysis. *Psychological Bulletin, 139*(5), 1090–1112. https://doi.org/10.1037/a0030939.

Banerjee, D. (2020). 'Age and ageism in COVID-19': Elderly mental health-care vulnerabilities and needs. *Asian Journal of Psychiatry, 51*, 102154. https://doi.org/10.1016/j.ajp.2020.102154.

Columbus, S., Molho, C., Righetti, F., & Balliet, D. (2020). Interdependence and cooperation in daily life. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspi0000253. Advance online publication.

Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology, 31*(1), 169–193. https://doi.org/10.1146/annurev.ps.31.020180.001125.

Deutsch, M. (1949). A theory of co-operation and competition. *Human Relations, 2*(2), 129–152. https://doi.org/10.1177/001872674900200204.

Eurofound. (2020). *Living, working and COVID-19: First findings*. Publications Office of the European Union. https://www.eurofound.europa.eu/publications/report/2020/living-working-and-covid-19#tab-05.

Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. *Nature, 415*(6868), 137–140. https://doi.org/10.1038/415137a.

Feldman, N. E. (2010). Time is money: Choosing between charitable activities. *American Economic Journal: Economic Policy, 2*(1), 103–130. https://doi.org/10.1257/pol.2.1.103.

Fetzer, T., Witte, M., Hensel, L., Jachimowicz, J. M., Haushofer, J., Ivchenko, A., … Yoeli, E. (2020). Global behaviors and perceptions in the COVID-19 pandemic. In *Working paper no. 20-111*. Harvard Business School. https://doi.org/10.31234/osf.io/3kfmh.

Gerpott, F. H., Balliet, D., Columbus, S., Molho, C., & de Vries, R. E. (2018). How do people think about interdependence? A multidimensional model of subjective outcome interdependence. *Journal of Personality and Social Psychology, 115*(4), 716–742. https://doi.org/10.1037/pspp0000166.

Hale, T., Angrist, N., Cameron-Blake, E., Hallas, L., Kira, B., Majumdar, S., … Webster, S. (2020). Variations in government responses to COVID-19. In *Working paper BSG-WP-2020/032 version 8.0*. Blavatnik School of Government. https://www.bsg.ox.ac.uk/covidtracker.

Johnson, T., Dawes, C., Fowler, J., & Smirnov, O. (2020). Slowing COVID-19 transmission as a social dilemma: Lessons for government officials from interdisciplinary research on cooperation. *Journal of Behavioral Public Administration, 3*(1). https://doi.org/10.30636/jbpa.31.150.

Kang, S. J., & Jung, S. I. (2020). Age related morbidity and mortality among patients with COVID-19. *Infection & Chemotherapy, 52*(2), 154–164. https://doi.org/10.3947/ic.2020.52.2.154.

Kerkhoff, A. D., Sachdev, D., Mizany, S., Rojas, S., Gandhi, M., Peng, J., … Marquez, C. (2020). Evaluation of a novel community-based COVID-19 "Test-to-Care" model for low-income populations. *PLoS One, 15*(10), Article e0239400. https://doi.org/10.1371/journal.pone.0239400.

Kluge, H. H. P. (2020, April 2). Statement – Older people are at highest risk from COVID-19, but all must act to prevent community spread. https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements/statement-older-people-are-at-highest-risk-from-covid-19,-but-all-must-act-to-prevent-community-spread.

Komorita, S. S., Sweeney, J., & Kravitz, D. A. (1980). Cooperative choice in N-person dilemma situation. *Journal of Personality and Social Psychology, 38*(3), 504–516. https://doi.org/10.1037/0022-3514.38.3.504.

Korn, L., Böhm, R., Meier, N. W., & Betsch, C. (2020). Vaccination as a social contract. *Proceedings of the National Academy of Sciences, 117*(26), 14890–14899. https://doi.org/10.1073/pnas.1919666117.

Ledyard, J. O. (1995). Public goods: A gurvey of experimental research. In J. H. Kagel, & A. E. Roth (Eds.), *The handbook of experimental economics* (pp. 111–194). Princeton University Press. https://resolver.caltech.edu/CaltechAUTHORS:20170823-160736011.

Ling, G. H. T., & Ho, C. M. C. (2020). Effects of the coronavirus (COVID-19) pandemic on social behaviours: From a social dilemma perspective. *Technium Social Sciences Journal, 7*(1), 312–320. https://ideas.repec.org/a/tec/journl/v7y2020i1p312-320.html.

Liu, K., Chen, Y., Lin, R., & Han, K. (2020). Clinical features of COVID-19 in elderly patients: A comparison with young and middle-aged patients. *Journal of Infection, 80*(6), e14–e18. https://doi.org/10.1016/j.jinf.2020.03.005.

Matsumoto, Y., Yamagishi, T., Li, Y., & Kiyonari, T. (2016). Prosocial behavior increases with age across five economic games. *PLoS One, 11*(7), Article e0158671. https://doi.org/10.1371/journal.pone.0158671.

Miller, D. T. (2001). The norm of self-interest. In J. Dienhart, D. Moberg, & R. Duska (Eds.), *Vol. 3. The next phase of business ethics: Integrating psychology and ethics* (pp. 193–210). Emerald Group Publishing Limited. https://doi.org/10.1016/S1529-2096(01)03013-9.

Olson, M. (1965). *The logic of collective action: Public goods and the theory of groups*. Harvard University Press.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Pancevski, B. B., Meichtry, S., & Fontdegloria, X. (2020, March 19). *A generational war is brewing over coronavirus*. The Wall Street Journal. https://www.wsj.com/articles/a-generational-war-is-brewing-over-coronavirus-11584437401.

Petretto, D. R., & Pili, R. (2020). Ageing and COVID-19: What is the role for elderly people? *Geriatrics, 5*(2), 1–4. https://doi.org/10.3390/GERIATRICS5020025.

Rapoport, A. (1967). A note on the "index of cooperation" for prisoner's dilemma. *Journal of Conflict Resolution, 11*(1), 100–103. http://www.jstor.com/stable/172934.

Read, D., & Read, N. L. (2004). Time discounting over the lifespan. *Organizational Behavior and Human Decision Processes, 94*(1), 22–32. https://doi.org/10.1016/j.obhdp.2004.01.002.

Romano, A., Bortolotti, S., Hofmann, W., Praxmarer, M., & Sutter, M. (in press). Generosity and cooperation across the life span: A lab-in-the-field study. *Psychology and Aging*. http://hdl.handle.net/21.11116/0000-0005-A945-F.

Rooney, P. M., Steinberg, K. S., & Schervish, P. G. (2001). A methodological comparison of giving surveys: Indiana as a test case. *Nonprofit and Voluntary Sector Quarterly, 30*(3), 551–568. https://doi.org/10.1177/0899764001303011.

Schaller, M. (2011). The behavioural immune system and the psychology of human sociality. *Philosophical Transactions of the Royal Society, B: Biological Sciences, 366*(1583), 3418–3426. https://doi.org/10.1098/rstb.2011.0029.

Spadaro, G., Tiddi, I., Columbus, S., Jin, S., ten Teije, A. A. C. M., & Balliet, D. (2020). *The cooperation databank*. PsyArXiv. https://doi.org/10.31234/osf.io/rveh3.

Tingley, D., Yamamoto, T., Hirose, K., Keele, L., & Imai, K. (2014). Mediation: R package for causal mediation analysis. *Journal of Statistical Software, 59*(5), 1–38. https://doi.org/10.18637/jss.v059.i05.

Van Bavel, J. J., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., … Willer, R. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour, 4*, 460–471. https://doi.org/10.1038/s41562-020-0884-z.

Van Lange, P. A. M., Balliet, D., Parks, C. D., & Van Vugt, M. (2014). *Social dilemmas: The psychology of human cooperation*. Oxford University Press.

Van Lange, P. A. M., Joireman, J., Parks, C. D., & Van Dijk, E. (2013). The psychology of social dilemmas: A review. *Organizational Behavior and Human Decision Processes, 120*(2), 125–141. https://doi.org/10.1016/j.obhdp.2012.11.003.

Van Lange, P. A. M., Otten, W., De Bruin, E. M. N., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology, 73*(4), 733–746. https://doi.org/10.1037/0022-3514.73.4.733.

West, R., Michie, S., Rubin, G. J., & Amlôt, R. (2020). Applying principles of behaviour change to reduce SARS-CoV-2 transmission. *Nature Human Behaviour, 4*, 451–459. https://doi.org/10.1038/s41562-020-0887-9.

Wu, Z., & McGoogan, J. M. (2020). Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *Journal of the American Medical Association, 323*(13), 1239–1242. https://doi.org/10.1001/jama.2020.2648.

Yamagishi, T. (1986). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology, 51*(1), 110–116. https://doi.org/10.1037/0022-3514.51.1.110.

Yamagishi, T. (1988a). Seriousness of social dilemmas and the provision of a sanctioning system. *Social Psychology Quarterly, 51*(1), 32–42. https://doi.org/10.2307/2786982.

Yamagishi, T. (1988b). The provision of a sanctioning system in the United States and Japan. *Social Psychology Quarterly, 51*(3), 265–271. https://doi.org/10.2307/2786924.