Consideration of others and consideration of future consequences predict cooperation in an acute Social Dilemma: An application to COVID-19

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Consideration of others and consideration of future consequences predict cooperation in an acute Social Dilemma: An application to COVID-19.

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Abstract

In the Netherlands, the COVID-19 pandemic raised an acute social dilemma where citizens could decide whether to comply with the precautionary measures recommended by the government. This paper examines the role of consideration of others and consideration of the future in explaining cooperation in a social dilemma.

Through an online survey (N=1,019), consideration of future consequences (CFC), consideration of others (COO) and compliance with the precautionary measures were measured. The data were analyzed by means of Tobit-regressions and ordinal logistic regressions.

Results show that COO and CFC are both positively correlated with compliance with recommended precautionary measures. Moreover, COO and CFC-future do not interact, although they are positively correlated. Gender, age, perceived risk of COVID-19 infection for others, perceived compliance by others and opinion about government response to the pandemic also have a significant association with compliance. These findings emphasize the importance of consideration of others as well as consideration of the future in the prediction of cooperation in social dilemmas.

1. Introduction

Many of the bigger public issues of this era are social dilemmas. Examples are resource depletion, environmental behavior and climate change (Biel & Thøgersen, 2007, Capstick, 2013; Jacquet et al., 2013; Kortenkamp & Moore, 2006; Raihani & Aitken, 2011), the Eurozone crisis (Caporaso, 2018), vaccine uptake (Korn et al., 2018) and also the current COVID-19 pandemic (Kirchler, 2020). According to the broad interdependence theory of Kelley and Thibaut (1978), cooperation in social dilemmas can be achieved when decision makers base their actions on group serving preferences, and consider the social as well as the future consequences of their actions. Two important factors that could thus determine a person's predisposition to cooperate, are their consideration of others and the future (Parks et al., 2013).

Consideration of others has been widely acknowledged to play a role in social dilemma situations, where individuals choose to take actions based on group serving preferences instead of purely maximizing their own payoffs (e.g. Balliet et al., 2009; Charness & Rabin, 2002; Englmaier & Gebhardt, 2016; Gueye et al., 2020). More specifically, in simulated social dilemmas in laboratory experiments, the consensus seems to be that individuals who act pro-socially give more weight to the collective consequences of actions whereas individuals who act egoistically give more weight to their immediate, personal gain (Cameron, Brown & Chapman, 1998). Additionally, studies have shown that consideration of the future also matters. More specifically, if people take the potential future consequences of current actions into account when making decisions, they are, for example, more likely to cooperate with reducing natural resource depletion (Joireman et al., 2009) and more likely to engage in preventative health behaviors (e.g. Crockett et al., 2009; Dorr et al., 1999; Orbell et al., 2004).

Until recently, however, consideration of others and consideration of the future have mostly been examined separately (e.g. Cameron et al., 1998; Bailliet et al., 2009; Zhao et al., 2012). Exceptions can be found in the domain of environmental studies, where the importance of social values and concerns for the future is more widely acknowledged (e.g. Joireman, et al., 2001; Khachatryan et al., 2013). More recently, the relation between intertemporal and social preferences is also studied using variations of economic games, such as repeated prisoner's dilemmas, public good games, and intertemporal dictator and ultimatum games (Kölle, Quercia & Tripodi, 2020; Rohde, van Exel & van Hulsen, 2022).

Consideration of others and consideration of the future can be independent drivers of behavior, but there is also evidence which suggests that they are not independent because current behavior can also have future consequences for others. As Chopra et al. (2021) and Kölle and Lauer (2020) argue, one can experience pro-social utility at the time of decision (now) as well as at the time the consequences are experienced by others (in the future). Current behavior then depends on the weight an individual gives to the pro-social utility she anticipates to experience in the future. This weight is inherently determined by the individual's

consideration of the future. According to construal level theory, others and the future refer to two types of psychological distance that are cognitively related: social and temporal distance (Trope and Liberman, 2010). If both types of psychological distance influence behavior in a similar way, then consideration of others and consideration of the future could be substitutes in explaining cooperation in a social dilemma. Alternatively, if current behavior has future consequences only for others and not for oneself, then consideration of the future will have explanatory power for behavior only to the extent that one cares about consequences for others. Hence, consideration of others and the future may interact when explaining behavior in a social dilemma. Therefore, this paper investigates whether and how Consideration of Others (COO) (Weinberger & Schwartz, 1990), and Consideration of Future Consequences (CFC) (Joireman et al., 2012; Strathman et al., 1994) jointly predict behavior in an acute social dilemma such as the one raised by the COVID-19 pandemic in a representative sample of the population of the Netherlands. The need for this type of research was emphasized by Parks (2015).

In December 2019 the first case of COVID-19 emerged in Wuhan, China. From then, the number of cases increased exponentially, and the virus spread rapidly across the globe. In most countries affected by this pandemic, governments decided to put their country in a state of complete lockdown, restricting all non-essential economic and social activities and requiring citizens to stay at home. However, in an attempt to balance the risks to public health and to the economy, the government of the Netherlands opted for what they called an "intelligent lockdown", which put the focus on moral appeals and self-discipline rather than repression (Kuiper et al., 2020). At the time of the data collection, the government had taken several general preventive measures focused on the highest risk activities and most vulnerable populations, such as closing bars and restaurants, schools and sports facilities, and restricting interactions with 'contact professions' (such as barbers and physiotherapists) and visits to family in nursing homes and other care facilities. However, it was not mandated to stay at home. More specifically, people were strongly advised to stay inside and work at home as much as possible, but it was not forbidden to go out and move around freely as long as a distance of 1.5 meters to others was maintained (de Haas et al., 2020). Group formation was not allowed and could result in a €390 fine, but surveillance did not increase significantly. The country borders remained open and there was limited testing capacity and activity. Besides, a number of precautionary measures were recommended by the government. These included the use of paper tissues, coughing or sneezing in elbows, and washing hands thoroughly and regularly (National Institute for Public Health and the Environment, RIVM, 2020), but, for example, not the use of face masks. Supplementary Material A, Appendix A gives a complete overview of the measures in the Netherlands at the time of the data collection. It is important to note that in the Netherlands, given its size and governance structure, there were hardly any regional differences in the course of the pandemic and in governmental measures, which especially at the beginning of the pandemic were implemented at the national level. The response of the government of

The Netherlands to the COVID-19 pandemic corresponded with a score of 73.2 out of a possible 100 on the Government Response Stringency Index, and ranked the Netherlands as the 97th strictest country out of the 177 indexed countries at that time (Hale et al., 2020).

According to Kirchler (2020), the COVID-19 pandemic can be put into a "social dilemma" framework, where it is advantageous for individuals to behave uncooperatively by not complying with the recommended precautionary measures and to exercise their freedom, as long as the majority of the population does comply with the measures. Because the "intelligent lockdown" was not focused on repression, compliance with the precautionary measures recommended by the government was discretionary. Similar to other social dilemmas, individual decisions whether or not to comply had both a social and an intertemporal component. For most people, COVID-19 is not a high risk for themselves and therefore an important part of the motivation to comply with the precautionary measures concerns protecting others for contamination, preventing overburdening of the health care system, and adhering to the social norm. Stronger consideration for others (COO) is therefore likely to be associated with higher compliance with the recommended precautionary behaviors. Compliance is also likely to be associated with consideration of the future, because it can be seen as preventative health behavior. People with higher consideration of future consequences are more likely to engage in prevention (e.g. Crockett et al, 2009; Dorr et al., 1999; Orbell et al., 2004). Consideration of the future can play a role through two main channels: people may merely care about the future consequences for themselves, but they may also care about the future consequences for others. Both these channels may be relevant in the COVID-19 pandemic as well. An individual benefit of compliance was not to get sick in the future, and one of the social benefits of compliance was to collectively beat the virus and "go back to normal" sooner. This study, therefore, investigates the relation of consideration of others and consideration of the future with compliance behavior, both separately and jointly, at the onset of the COVID-19 pandemic.

Only few papers studied the predictive power of social and future considerations jointly. Campos-Mercade et al. (2021) measured respondents' willingness to expose others to risk by means of a "risk dictator game" and found that social preferences predict COVID-19 related health behaviors amongst a general population sample of Sweden, whilst controlling for time preferences as measured in the Global Preference Survey of Falk et al. (2018). In a representative sample of the German population, Fang et al. (2021) found that both on individual and regional level, pro-sociality and patience are strongly and positively related to compliance whereas risk-taking is negatively related. Our study is similar to Campos-Mercade et al. (2021) and Fang et al. (2021) in considering both social and future orientation in relation to compliance with COVID-19 precautionary measures, and in measuring this in a general population sample. However, we use different measures of social and future orientation.

So far, two other studies have looked at compliance behavior in the Netherlands (Kuiper et al., 2020; Folmer et al. 2020). These studies concern an initial and a follow-up study looking at various factors that could explain compliance to social distancing, but they do not look at social and future considerations. Several studies in other countries examine various psychosocial predictors of compliance with social distancing and related measures introduced during the pandemic (e.g. Barragan et al., 2021; Clark et al., 2020; Fischer, Chaudhuri & Atkinson, 2021; Han, 2021; Jovančević & Milićević, 2020; Plohl & Musil, 2021; Rammstedt, Lechner & Weiß, 2021; Wright, Steptoe & Fancourt, 2021). These studies also do not consider social and future considerations and focus on different predictors instead (including the Big 5 personality traits). Dinić and Bodroža (2021) focused on the predictive power of social considerations but did not measure considerations of the future. They measured selfishness and prosocial tendencies amongst Serbians and found that prosocial tendencies (selfishness) had a positive (negative) effect on protective behaviors. Wismans et al. (2021) focused on the predictive power of future considerations but did not measure social considerations. They found a negative relation between impulsivity and compliance and a weak (unexpected) positive relation between delay discounting and compliance amongst students of seven European countries. In a 95% student sample, Müller and Rau (2021) found that patience increased citizens' willingness to stay home and avoid crowds.For the purpose of the current study, we collected data from 1,019 citizens of the Netherlands, quota-sampled to be representative of the population aged 18 to 75 years in terms of age, gender and education level. In the last week of March 2020, they participated in an online survey covering questions concerning their attitudes and behavior at that stage in the pandemic. The timing of the data collection is important and unique to this study, as at the time, the Netherlands experienced an upward trend in cases and hospital admissions, and increasing worries about reaching full Intensive Care capacity in hospitals. Moreover, relatively little was known about the virus and testing capacity was still very limited. Compliance with precautionary measures was thus of utmost importance, yet not strictly enforced.

The survey consisted of three parts. The first part asked several questions concerning attitudes and behaviors relating to the COVID-19 pandemic, the second part asked several demographic questions, and the last part presented respondents with various scales measuring several psychological constructs. Among these scales were the Consideration of Future Consequences (CFC) and the Consideration of Others (COO) scales. This paper will focus on the questions related to compliance with the precautionary measures recommended by the government and the CFC and COO scales, whilst controlling for demographic characteristics. The data will first be used to explore what the individual influence of the separate constructs is on compliance behavior, expecting that a higher COO and a higher CFC predict higher compliance. Secondly, we will investigate the relation between these two constructs and whether their interaction contributes to explaining compliance behavior.

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Results from our analysis show that both social (COO) and future (CFC) considerations are positively correlated with compliance with the recommended precautionary measures. COO appears to have more explanatory power than CFC. While COO and CFC were positively correlated, we did not find an association between their interaction and compliance. Being female and having a higher age were also positively related to compliance. The social aspect of compliance is also reflected in the significance of the perceived COVID-19 risk for others, where higher perceived risk for others was associated with higher compliance. An increase in perceived compliance by others also positively related to compliance. Additionally, deeming the government response to the pandemic as insufficient was associated with higher compliance whereas deeming it exaggerated was associated with lower compliance as compared to individuals who were neutral in their opinion on government response. Overall, the results support the importance of looking at considerations of others as well as the future in the context of social dilemmas. Our results are therefore in line with the abovementioned research, finding a relation between social as well as future orientation and compliance with COVID-19 precautionary measures.

2. Method

2.1 Respondents and procedure

The data used for this paper is part of a larger survey for which the data was collected from the 27th till the 30th of March 2020, one month after the first confirmed case of COVID-19 in the Netherlands, using an online survey sampling company (Dynata). The target was to reach 1,000 respondents, quota sampled with respect to age, gender and education level, to be representative of the population of the Netherlands aged between 18 and 75 years. The final sample size consisted of 1,019 respondents after data quality check by the survey company, excluding respondents based on early termination, speeding, straightlining and bad response to open questions (this concerns an internal data check, no data on excluded respondents is provided). No formal sample size calculations were performed and no additional data were collected after looking at the results. The survey consisted of three parts: i) COVID-19 related attitudes and behaviors, ii) Demographics, iii) Psychological scales. The first part included questions on experience with COVID-19, risk perceptions related to infection with COVID-19, behavioral response to COVID-19, opinions on the government response to the pandemic, and questions regarding preferences for the allocation of Intensive Care capacity. The second part of the survey consisted of questions regarding demographic characteristics, including age, gender, employment status, education, religious beliefs, living situation and self-reported health and happiness. The third part consisted of various instruments to assess psychological concepts, including considerations of others and the future. The data was collected for multiple purposes, and only part of the questions in the survey are used as variables in this study. Supplementary Material B gives a complete overview of the survey. The study in this manuscript was not pre-registered.

2.2 Measures

Consideration of Future Consequences (CFC)

We measured concerns for the future with the 14-item Consideration of Future Consequences (CFC) scale, as proposed by Joireman et al. (2012). The version of the CFC scale consists of 7 future-oriented items and 7 present-oriented items and is an extension of the original 12-item scale introduced by Strathman et al. (1994). All items are scored on a 5-point scale ranging from 'extremely uncharacteristic' (score=1) to 'extremely characteristic' (score=5) (see Supplementary material A, Appendix A for complete scale).

To create a total score for this scale (CFC-total), the present-oriented (or immediate) items are reverse scored and then added to the future-oriented items, with higher scores indicating higher consideration of the future. However, Joireman et al. (2012) argue that a two-factor model, making a distinction between the present- and the future-oriented items, thus creating a CFC-immediate and CFC-future subscale, has more explanatory power. A higher score on the CFC-immediate subscale indicates stronger present orientation, and a higher score on the CFC-future subscale indicates stronger future orientation. Although individuals might be dominantly future- or present-oriented, it could also be that that they are concerned with both. This two-factor approach is also supported by several other studies (Adams, 2012; Joireman et al., 2008; Murphy et al., 2020; Petrocelli, 2003; Rappange, Brouwer & van Exel, 2009; Toepoel, 2010; for an exception, see Hevey et al., 2010). We will also consider these two subscales separately.

The CFC-scale has been widely applied in various areas. As mentioned in the introduction, individuals who are more concerned about the future consequences of their actions, are more likely to engage in preventative health behaviors (e.g. Crockett et al., 2009; Dorr et al., 1999; Orbell et al., 2004), and are more likely to behave more environmentally friendly (Joireman et al., 2009).

Consideration of Others (COO)

We measured concerns for others with the 7-item Consideration of Others (COO) scale, a subscale of Weinberger's self-restraint scale and part of the Weinberger Adjustment Inventory (Weinberger & Schwartz, 1990). This inventory aims to measure emotional distress and self-restrain, and can be used on samples including older children, adolescents and adults. Although COO is a subscale of self-restraint, it is reliable and can be used separately from the other subscales (Weinberger & Schwartz, 1990). Two of the COO items are scored on a 5-point 'False' (score = 1) to 'True' (score = 5) scale and the other five items are scored on a 5-point 'Almost Never' (score = 1) to 'Almost Always' (score = 5) scale. To calculate the total COO-score, scores on the 7 items are added, with higher scores indicating higher consideration of others (see Supplementary material A, Appendix A for complete scale).

Overall, the self-restraint scale is used in various research areas, and low self-restraint has for example been related to higher levels of alcohol abuse (Weinberger & Bartholomew, 1996), whereas high self-restraint is positively related to academic achievement (Wentzel et al., 1990). Farrell and Sullivan (2000) and Jones, Cauffman and Piquero (2007) use the Consideration of Others subscale separately from the other self-restrained subscales and show, for example, that parental support is less influential in reducing antisocial behavior of their children when these children are low in COO (Jones et al., 2007).

Compliance with the personal measures

To assess compliance with the prevailing precautionary measures, we asked eight questions concerning the recommended COVID-19 related behaviors (see Supplementary Material B): 1) washing hands regularly for 20 seconds, 2) coughing and sneezing in the elbow, 3) use of paper tissues, 4) keeping 1.5m distance when outside, 5) no handshakes, 6) staying inside in case of symptoms of a cold, 7) staying inside if a housemate has fever, and 8) only going out for essentials (such as a visit to the grocery store or pharmacy). The first four are answered on a 5-point scale ranging from 'never' (score = 1) to 'always' (score = 5) and the latter four are answered on a 4-point scale ranging from 'no' (score = 1) to 'yes, always' (score = 4). These eight precautionary compliance items are normalized to a mean of 0 and a standard deviation of 1, and then averaged, resulting in one average compliance score ranging between -3.46 and 0.67 (*Cronbach's alpha* = 0.81).

It is important to note that these eight compliance items separately do not necessarily satisfy the social dilemma framework in terms of posing a tension between social and self-serving behavior. However, taken together, they do generate such a dilemma structure because compliance to these precautionary measures at the societal level contributes to containing the spread of COVID-19.

It is also important to note that this paper makes a distinction between general and precautionary measures. General measures are all actions taken by the government to contain the spread of the virus, such as closing schools and restaurants and banning public gatherings. Precautionary measures concern the measures recommended by government that can be followed by citizens on a voluntary basis. The eight items used to calculate the average compliance score as mentioned above concern the precautionary measures.

Control variables

Several variables are used as control variables, including the demographic variables age, gender and education level as well as variables related to risk perception for self and others, perceived compliance by others and opinions about government response to the pandemic.

Respondents were also asked whether they believe other citizens of the Netherlands comply with the eight above-mentioned precautionary measures, using a similar question as for self-assessed compliance. Scoring

is also the same, with each item normalized to a standard deviation of 1 and a mean of 0, and then averaged, resulting in a score for average perceived compliance by others ranging between -2.55 and 1.49 (*Cronbach's alpha* = 0.85).

For each respondent, we also measured the perceived risk of 1) becoming infected with COVID-19, 2) becoming ill if infected and 3) dying from COVID-19 for i) themselves, ii) their loved ones (family and friends) and iii) other citizens of the Netherlands. These nine variables were all scored on a 5-point scale ranging from 'no risk' (score = 0) to 'extremely high risk' (score = 4). In addition, we also asked respondents to score their health on a scale from 0 to 10, with 0 being the worst imaginable health and 10 the best imaginable health. This score was then recoded to a binary variable with a value of 1 indicating poor self-assessed health (scoring lower than 6 out of 10, which in grading systems in the Netherlands is generally seen as insufficient).

Lastly, we asked respondents' opinions about the government response to the COVID-19 pandemic and the effectiveness of measures imposed by the government to control the spread and number of contagions. The opinion about the government response was scored on a 5-point scale ranging from 'very exaggerated' (score = 0) to 'highly insufficient' (score = 4). The overall opinion about the effectiveness of the general and precautionary measures was scored on a 5-point scale ranging from 'not at all effective' (score = 0) to 'highly effective' (score = 4).

3. Results

3.1 Descriptive Statistics

Table 1 and Figure 1 describe the sample of respondents in terms of demographics. 53.2 percent of the sample is female, which means they are slightly overrepresented (50.3 percent women; Centraal Bureau Statistiek, 2020). The average age is 48, with a minimum age of 18 and a maximum age of 77. This means that inhabitants of 80 years and older, which make up approximately 4.7 percent of the population of the Netherlands (Centraal Bureau Statistiek, 2020), are not included in this research. Furthermore, 28.3 percent has a low education level, 36.3 percent a middle education level and 35.4 percent is highly educated. Higher educated are thus slightly overrepresented (27.9 percent, 38.1 percent and 32.5 percent respectively; Centraal Bureau Statistiek, 2020).

Table 1 Summary statistics demographic variables

| Variable	Category	Frequency
Gender	Female	542 (53.19%)
	Male	477 (46.81%)
Age	18-24	101 (9.91%)
	25-34	147 (14.34%)
	35-44	189 (18.55%)
	45-54	192 (18.84%)
	55-64	181 (17.76%)
	65-77	209 (20.51%)
Education level	Low	288 (28.26%)
	Middle	370 (36.31%)
	High	361 (35.43%)
Perception about government response	Very exaggerated	31 (3.04%)
	Somewhat exaggerated	65 (6.38%)
	Fitting	657 (64.47)
	Somewhat insufficient	208 (20.41%)
	Highly insufficient	58 (5.69%)
Perceived effectiveness of general and precautionary measures	Not at all effective	26 (2.55%)
	Somewhat ineffective	106 (10.40%)
	Neutral	314 (30.81%)
	Somewhat effective	498 (48.87%)
	Highly effective	75 (7.36%)

Table 1 also shows that 64.5 percent of our sample believes that the government response to the COVID-19 pandemic was fitting, 9.4 percent believes the reaction was exaggerated, and 26.1 percent believes the government should have done more. Additionally, 56.2 percent of the sample believes that the precautionary measures were (highly) effective, 13.0 percent believes the measures were not (at all) effective, while the remaining respondents were neutral on the matter. Since there were only limited responses on the extreme ends of both these scales, the data is converted to a 3-point scale (i.e., ineffective/insufficient, neutral/fitting and effective/exaggerated) for further analysis.

Figure 1 summarizes perceived risks of COVID-19. On average people believe that they themselves are less likely than the general population of the Netherlands to become infected, and become ill or die if infected with COVID-19. The perceived risk for self and for loved ones is not significantly different when it comes to becoming infected or ill.

Inter-item correlation of these risk assessments is high, all being significantly positively correlated (see Table 1, Supplementary Material A, Appendix B). Since this paper studies the effect of consideration of others, a distinction is made between 1) perceived risk for self and 2) perceived risk for loved ones and other citizens of the Netherlands. The average of the three and the six variables are used to create a variable for perceived risk for self (*Cronbach alpha* = 0.79) and a variable for perceived risk for others (*Cronbach*

alpha = 0.86), respectively. Average perceived risk for self was 1.63 and significantly lower than for others ($\mu = 1.88$, $z = 14.10$, p<0.001).

Figure 1 Perceived risk of becoming infected, becoming ill if infected, and death if infected on a scale from 1 to 5.
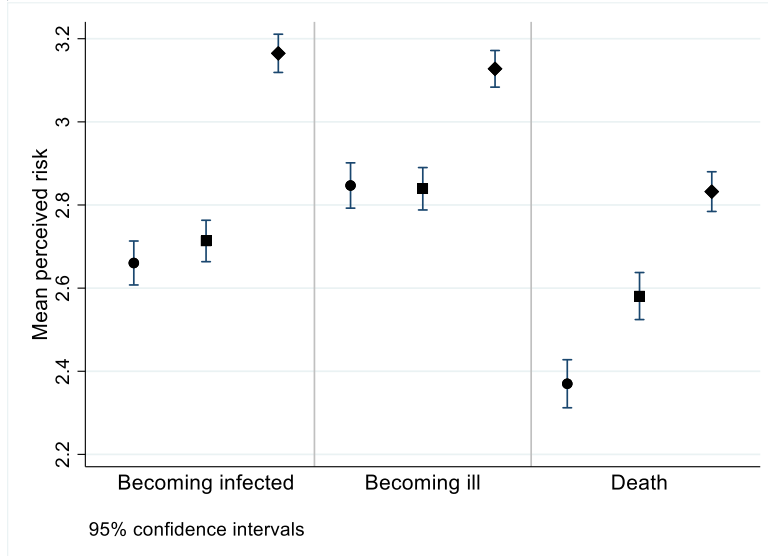
Note: For each of the risk assessments, the black circle indicates average perceived risk for self, the square indicates average perceived risk for loved ones (family and friends) and the diamond indicates average perceived risk for other citizens of the Netherlands.

3.2 Social and Temporal orientation

On average, the CFC-total score in our sample equals 30.3 (on a scale from 0 to 56*; S.D.* = 6.40). The CFC-total scale is of acceptable internal consistency, with a Cronbach's alpha of 0.72. Nevertheless, our data support the two-dimensional approach as proposed by Joireman et al. (2012). The two sub-scales are not correlated ($\rho = 0.0081$, $p = 0.796$), implying that concerns for the present and the future are not two ends of the same scale, and the internal consistencies of the CFC-immediate and CFC-future subscales are more favorable, with Cronbach's alphas of 0.81 and 0.72, respectively. Individuals are slightly more future-oriented, with a median CFC-future score of 17 (*mean* 16.7, *S.D.* 4.03), compared to a CFC-immediate score of 15 (*mean* 14.4, *S.D.* 5.00), both on a scale from 0 to 28. There are no gender differences for the CFC-future score, but women score significantly lower on the CFC-immediate score (*mean* = 13.9*, S.D.* = 5.20 versus *mean* = 15.1, *S.D.* = 4.70, $t = 3.87$, p<0.001). Age is significantly negatively correlated with CFC-future ($\rho = -0.14$, $p< 0.001$), but not with CFC-immediate ($\rho = 0.03$, $p = 0.367$). Moreover, higher educated are less immediate-oriented and more future-oriented than lower educated (CFC-immediate: low education level: *mean* = 16.2, *S.D.* = 4.48; middle: *mean* = 14.6, *S.D.*= 4.70; high: *mean* = 12.9, *S.D.*= 5.23, $\chi^2 = 75.0$, $p < 0.001$; CFC-future: low education level: *mean* = 16.0, *S.D.* = 4.18, middle: *mean* = 16.4, *S.D.* = 3.84, high: *mean* = 17.6, *S.D. = 3.94*, $\chi^2 = 29.8$, $p < 0.001$).

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For COO, we find a Cronbach's alpha of 0.84, indicating that the scale indeed has a good internal consistency. The median COO score is 19 (*mean* 18.9, *S.D.* 4.29) on a scale from 0 to 28, with women scoring significantly higher than men (*mean* = 19.5, *S.D.* = 4.30 versus *mean* = 18.1, *S.D.* = 4.16, z = -5.214, $p < 0.001$). COO does not differ for different education levels ($\chi^2 = 0.357$, $p = 0.837$) and is also not correlated with age ($\rho = 0.055$, $p = 0.080$).

The correlation between COO and CFC-immediate is -0.024, which is in the expected direction yet insignificant ($p = 0.447$). COO and CFC-future are significantly positively correlated ($\rho = 0.35$, $p < 0.001$) as are COO and CFC-total ($\rho = 0.24$, $p < 0.001$). This reinforces the findings from Trope and Liberman (2010) that social and temporal distance are cognitively related.

To simplify the interpretation of the coefficients in our regression analyses, the COO as well as the CFC-total, CFC-future and CFC-immediate scales are normalized to a mean of 0 and a standard deviation of 1.

### 3.3 Compliance with the personal measures

Figure 2 shows that compliance with the eight precautionary measures recommended by the government is high, with scores to the separate compliance items ranging from 4.15 to 4.57 for the four items scored on a scale from 1 to 5 and between 3.28 to 3.74 for the four items scored on a scale from 1 to 4. This high level of compliance was also found in the other papers on COVID-19 compliance in the Netherlands (Folmer et al. 2020; Kuiper et al., 2020). Interestingly, respondents believe that they comply better than other citizens of the Netherlands for all compliance items. The average perceived compliance scores of others range from 3.52 to 3.60 for the four items scored on a scale from 1 to 5 and from 2.81 to 3.22 for the four items scored on a scale from 1 to 4.

The data show that most individuals stopped shaking hands (83.8 percent of the sample) and kept 1.5 meters distance from others when outside (66.5 percent of the sample always keeping distance and 26.7 percent keeping distance most of the time), indicating that people did try to lessen direct contact with people outside their household. More than half of the respondents only left their house for essentials (such as for grocery shopping or to visit the pharmacy), thus voluntarily chose to stay inside. One factor that could explain why overall compliance is high, is the public support for the general and precautionary measures.

A total of 159 individuals (15.6 percent of the sample) reported to comply fully with all precautionary measures, and only one individual did not comply with any of the measures. Women reported a higher compliance than men ($\chi^2 = 62.96$, $p < 0.001$). Compliance also increased with age (*Pearson* $\chi^2 = 22.83$, $p < 0.001$), which is perhaps not surprising since COVID-19 is more dangerous for vulnerable people, including older people. It could thus be argued that the social dilemma is weaker for elderly since there is less of a mismatch between personal and social goals in compliance with the eight precautionary measures.

We will test this hypothesis by adding interactions between vulnerability proxies (such as age, perceived risk to self, self-assessed health and perceived risk to others) and COO and CFC-future to the regressions discussed in Section 3.4.

Figure 2 Compliance with the eight separate compliance items
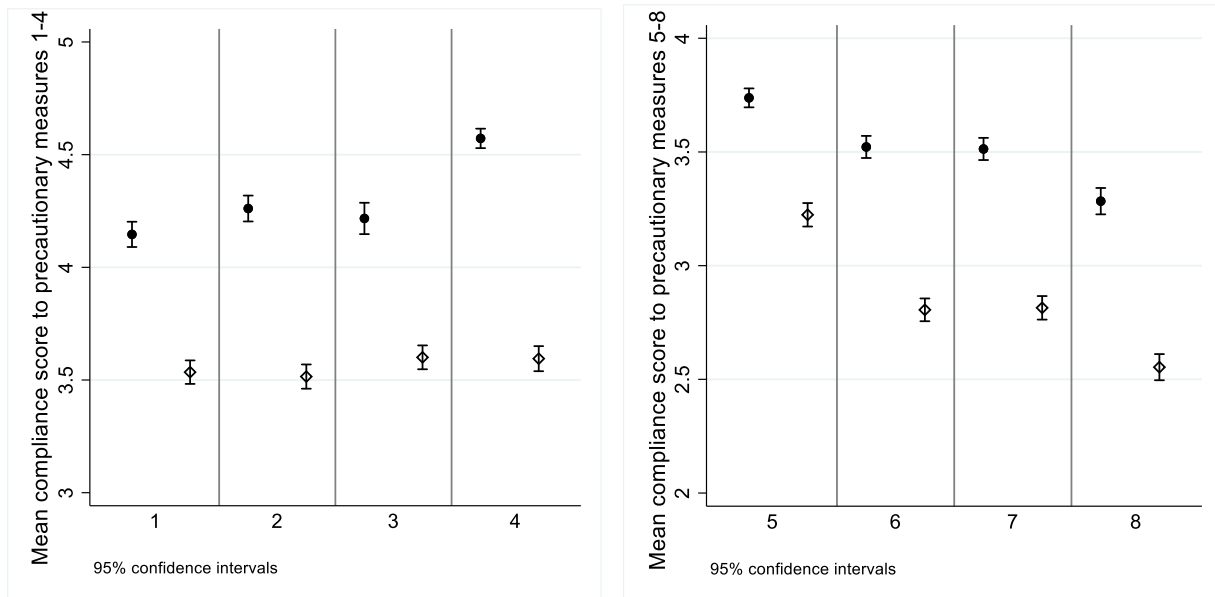
Note: For each of the compliance items the black circle shows the average self-reported compliance of respondents, while the hollow diamond shows the respondent's perceived compliance of others. The 8 compliance items are: 1) washing hands regularly for 20 seconds, 2) coughing and sneezing in the elbow, 3) use of paper tissues, 4) keeping 1.5m distance when outside, 5) no handshakes, 6) staying inside in case of symptoms of a cold, 7) staying inside if a housemate has fever and 8) only going out for essentials (such as a visit to the grocery store or pharmacy). Measures 1-4 are scored from 1 = never to 5 = always, measures 5-8 are scored from 1 = no to 4 = yes, always.

Respondents showed high support for measures that were in place in the Netherlands at the time of the data collection (see Figure 1A in Supplementary Material A, Appendix B), moderate support for measures that neighboring countries had implemented (items 1, 3, 5, 6 and 7 in Figure 1B, Supplementary Material A, Appendix B) and little support for measures that no country at that point had implemented. The "intelligent lockdown" thus seems to be supported by the respondents.

3.4 Determinants of compliance with the COVID-19 personal measures

We performed several regressions to discover the determinants of compliance. We ran Tobit regressions to account for the negative skewness of the data (with 159 respondents reporting to fully comply with all measures). Moreover, we ran ordered logistic regressions on the eight separate compliance items to determine the effect of COO and CFC-future on these items separately (see Table 5 in Supplementary Material A, Appendix C). Table 2 lists the results of regressing the average self-reported compliance score

on multiple individual characteristics. To account for heteroskedasticity, robust standard errors were used in the regression models.

Models 1-3 in Table 2 show that both COO and CFC-future have a statistically significant positive effect on compliance. Moreover, the effect of their interaction is insignificant. Hence, even though COO and CFC-future are positively correlated, they do not strengthen or weaken each other's effect on compliance. Overall, COO explains more of the variance in compliance than CFC-future, as can be seen from the smaller AIC for Model 1 than Model 2. In all models, COO also has a larger coefficient than CFC-future. From Model 1 we can see that a one standard deviation increase in COO leads to a 0.24 point increase in the predicted (uncensored) standardized compliance score. The individual effect of CFC-future (Model 2) is smaller, with one standard deviation increase in CFC-future leading to a 0.14 point increase in the predicted (uncensored) standardized compliance score. The effect of CFC-future is robust also when CFC-immediate is added or the complete CFC scale is used (see Tables 2 and 3 in Supplementary Material A, Appendix C). When using the complete CFC scale, the negative effect of the interaction between COO and CFC becomes significant at a 5%-level in Models 5 and 7.

Model 4 of Table 2 includes the demographics on which we sampled. Both being female, and age are positively related to compliance. Allowing for a non-linear impact of age by including its square resulted in similar results. Overall, across all age groups compliance is quite high, but the variation in compliance is larger at lower ages (see Figure 3 in Supplementary Material A, Appendix B). This could be indicative that COVID-19 poses a larger social dilemma for younger people than for older people, as the personal gains and collective gains of complying are more aligned for older people than for younger people. Model 4 shows that education has no significant impact on compliance.

In Models 5, 6 and 7, several variables are added to Model 4. These variables increase overall variance explained in the data without substantially changing the effects of the variables in Model 4. In Model 5 we added variables related to the self. The effect of perceived risk for self is in the expected direction, with people with higher average risk complying more. Interestingly, self-assessed health was not associated with compliance, despite the fact that those with poorer health have a higher risk of becoming ill and dying if infected with COVID-19. We tested different operationalizations of this variable, but all were insignificant.

In Model 6, variables concerning others are added to Model 4. A higher perceived risk for others is associated with a higher compliance. Additionally, if people perceive other individuals as more compliant, they are also more compliant.

In Model 7, variables concerning the perception on government response and the effectiveness of the general and individual precautionary measures are added. People who deem the government response

insufficient, comply more as compared to individuals who find the reaction fitting. People who think the response is exaggerated comply substantially less, ceteris paribus. The overall opinion on the effectiveness of the general and precautionary measures also seems to matter for compliance, with people thinking that the measures are ineffective also complying significantly less as compared to people who are neutral or perceive the measures as effective.

Finally, all these variables are combined in Model 8. This results in a pseudo R^2 of 0.20, which indicates that the model explains a considerable proportion of the variance in compliance. Almost all variables had a similar impact across the different models, except for perceived risk for self, which becomes insignificant. More specifically, when perceived risk for others is added to Model 5, perceived risk for self becomes insignificant. The perceived risk for others thus seems to matter more in the compliance decision than the perceived risk for self. Additionally, the opinion on the precautionary measures becomes insignificant. This change of significance occurs when compliance by others is added to Model 7.

The local effect size f^2 was calculated for the variables of interest (Selya et al., 2017):

$$f^2 = \frac{R_{AB}^2 - R_A^2}{1 - R_{AB}^2}$$

where B are the variables of interest (COO, CFC-future and their interaction), A is the set of all other variables in Model 7, R_{AB}^2 is the proportion of variance accounted for by A and B together (relative to a model with no regressors), and R_A^2 is the proportion of variance accounted for by A (relative to a model with no regressors). The numerator thus reflects the proportion of variance uniquely accounted for by our variables of interest. The resulting effect size of these variables is relatively small ($f^2 = 0.039$, $R_{AB}^2 = 0.20$, $R_A^2 = 0.17$). With this effect size, a post hoc power analysis using G*Power (Faul et al., 2009) showed that the power to detect an effect of this size was large (Power ($1-\beta$ err prob) > 0.999).

Overall, COO seems to matter more than CFC-future in predicting compliance. Using quantile regression (Table 4 in Supplementary material A, Appendix C), we see that the effect of CFC-future is significant for the second quartile (Q2) but not for the first and the third. When compliance is low, higher CFC-future will thus not increase compliance, but for this middle group, higher CFC-future does increase compliance. Moreover, the effect of COO on compliance is consistent for all levels of compliance, although slightly stronger at lower levels of compliance. We also find some evidence that COO and CFC-future might partially be regarded as substitutes at lower levels of compliance, given the significant negative interaction term for Q1 and Q2. Another interesting aspect is that for the lowest compliance group, perceiving the measures as effective increases compliance, whereas this is not the case for the middle and higher compliance groups.

When investigating compliance with the eight separate compliance items (Table 5 in Supplementary Material A, Appendix C), we see that the effect of COO is consistently significant over all measures, except for staying at home with cold. This might be due to the fact that social and individual preferences are aligned in this case (if you are sick, you also do not want to go out). CFC-future is only significant for three out of the eight measures. One possible explanation for this finding could be that respondents may have seen these three measures as having the most long-term benefits, but our data do not allow us to investigate this further and we also cannot find theoretical grounds for this hypothesis. The finding supports our conclusion that for compliance the importance of CFC-future seems to be lower than the importance of COO.

Moreover, as previously discussed, we hypothesize that for more vulnerable people, individual and social preferences are more aligned, leading to a weaker social dilemma. However, when adding proxies for vulnerability (age, perceived risk for self, self-assessed health and perceived risk to others) to Model 8 (Table 6 in Supplementary Material A, Appendix C), there are no significant interactions between COO and any of these proxies and only the interaction between age and CFC-future is significant at 5%-level and in the expected (negative) direction. The effect of COO and CFC-future thus do not seem to be influenced by vulnerability.

Table 2 Tobit regression with robust standard errors of average compliance with precautionary measures

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
1. COO	0.24***		0.21***	0.16***	0.15***	0.11***	0.14***	0.11***
	(0.03)		(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
2. CFC-future		0.14***	0.06*	0.11***	0.11***	0.07**	0.09***	0.06**
		(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
3. COO × CFC-future			-0.03	-0.03	-0.03	-0.03	-0.02	-0.03
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
4. Female				0.31***	0.31***	0.29***	0.26***	0.24***
				(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
5. Age				0.01***	0.01***	0.01***	0.01***	0.01***
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
6. Education level: Low								
Middle				0.05	0.06	0.07	0.03	0.05
				(0.06)	(0.06)	(0.05)	(0.05)	(0.05)
High				-0.03	-0.02	0.02	-0.05	0.01
				(0.06)	(0.06)	(0.06)	(0.06)	(0.05)
7. Perceived risk for self					0.11**			-0.03
					(0.03)			(0.04)
8. Poor self-assessed health (<6/10)					0.07			0.09
					(0.07)			(0.06)
9. Perceived compliance of others						0.28***		0.27***
						(0.04)		(0.03)
10. Perceived risk for others						0.27***		0.25***
						(0.04)		(0.05)
11. Perception government response to pandemic: Fitting								
Insufficient							0.16**	0.14**
							(0.05)	(0.05)
Exaggerated							-0.59***	-0.52***
							(0.08)	(0.07)
12. Perceived effectiveness measures: Neutral								
Effective							0.07	0.08
							(0.05)	(0.04)
Ineffective							-0.14*	-0.08
							(0.08)	(0.07)
(Constant)	0.06**	0.07***	0.08**	-0.61***	-0.78***	-1.07***	-0.51***	-0.93***
	(0.02)	(0.02)	(0.02)	(0.11)	(0.13)	(0.13)	(0.11)	(0.13)
Obs	1019	1019	1019	1019	1019	1019	1019	1019
Pseudo R-squared	0.05	0.02	0.05	0.10	0.11	0.16	0.15	0.20
F	76.86	29.76	28.00	27.50	22.64	31.82	26.55	27.53
AIC	2159.04	2225.56	2152.03	2046.90	2032.14	1920.28	1949.78	1838.44

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. COO and CFC are normalized to a standard deviation of 1. Uncensored observations: 860, Right-censored observations: 159. Robust standard errors between parentheses.

4. Discussion

The aim of this study was to test the hypothesis that social and future orientation are important for explaining cooperative behavior in social dilemmas. The government response to the COVID-19 pandemic in the Netherlands provided an excellent setting to test this hypothesis in a real-life context. More specifically, the government recommended a number of precautionary social distancing and personal hygiene measures to help contain the spread of COVID-19, and heavily relied on the responsibility and individual choices of citizens whether or not to comply with these measures. Using a general adult population sample from the Netherlands, we measured respondents' consideration of others (COO), consideration of future consequences (CFC) and compliance with the precautionary measures during the COVID-19 pandemic.

Regression analyses showed that both a higher score on COO and a higher score on CFC-future correspond to a higher self-reported compliance with the personal measures, confirming the findings from previous literature that both social and future orientation are relevant for cooperation in social dilemmas.

Our findings that consideration of others and the future are both important predictors of behavior in a social dilemma concerning health, echoes with findings in environmental sciences where the role of these predictors has been acknowledged before (e.g. Joireman et al., 2001; Khachatryan et al., 2013). Our results showed that COO explains more of the variance in compliance during the COVID-19 pandemic than CFC-future. One potential reason for social orientation having a stronger effect on compliance than future orientation in this context could be the communication by the government that focused on the communal need to comply with the precautionary measures, with slogans such as "together, we'll get corona under control". Additionally, for most individuals, COVID-19 is riskier for others than for themselves. This might also contribute to the stronger effect of COO. Using incentivized measures of considerations of others, Campos-Mercade et al. (2021) also found that social orientation can predict health behaviors during the COVID-19 pandemic.

Although we do find a significant correlation between COO and CFC-future, they do not significantly interact and thus do not weaken or strengthen each other's effect. Nevertheless, using quantile regression, we did find a significant negative interaction between COO and CFC-future at lower levels of compliance. At these levels, COO and CFC-future thus appear to partially substitute each other. To increase compliance of individuals at the lower levels of the distribution, it might thus be sufficient to focus on only appealing to their consideration of others, since this has the strongest effect on compliance.

In addition to consideration of others and the future, several other variables were found to be significant predictors of compliance. Overall, females reported to comply significantly more than males and older people also reported higher compliance than younger people. Higher perceived risk of infection, illness and

death for self also increased compliance, but this effect disappeared when risks for others was added to the model. On average, people who deemed the government response to the pandemic insufficient, complied more to the personal measures than people who thought the government reaction was fitting. This effect was even stronger but in the opposite direction for individuals deeming the government reaction exaggerated. Interestingly, other-regarding variables such as perceived risk of infection, illness and death for others and compliance by others were both also significant. If a person perceives the risk for others as high, (s)he is also likely to comply more. Similarly, if a person perceives compliance by others as high, (s)he is also likely to comply more. This latter effect can be interpreted in various ways. First of all, it could be that the opinion of compliance of others is based on their own social network. Then, it could be that people who comply more themselves are surrounded with other compliers, based on for example shared norms and values. Secondly, it could also be that there is an anchoring and adjustment effect (Tversky & Kahneman, 1974). The respondents could anchor their response to the questions about compliance of others, which followed the questions about their own compliance, to their own behavior and insufficiently adjust downwards. This would mean that people who themselves score high on compliance, also score the compliance of others higher. Thirdly, given that people who complied themselves also might have had limited contact with others, they might have used their own compliance as reference and used Bayesian updating to form their beliefs on the compliance of others. Finally, compliance of others may also influence own compliance through, for instance, social norms and conditional cooperation (Keser & van Winden, 2000).

A number of limitations of this study need to be mentioned. First, like in similar studies conducted in the Netherlands, we observed high compliance with the precautionary measures. Our measurement of compliance, however, was self-reported. Despite anonymity of response, a social desirability bias might have led respondents to over-report compliance with the personal measures (Paulhus, 1984).

Secondly, the measures of social and future orientation were also self-reported. The use of COO to measure social orientation is somewhat unconventional; research focusing on social dilemmas often uses a monetary measure of social value orientation (SVO, e.g. Grosch & Rau, 2017; Brizi et al., 2015). We chose to use COO as we thought it would be easier for respondents to comprehend and complete in the context of an elaborate online survey. Our findings support the use of COO to measure social orientation, but studies comparing the validity of these different measures of social preferences are recommended. Similarly, our findings further support the use of the CFC-future subscale as an alternative to commonly used time preference measures.

Another factor that needs to be considered is the fact that our survey took place at the start of the pandemic. Compliance may well be different in a later stage of the pandemic. Further research is needed to assess the

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drivers of *sustained* compliance. Finally, our survey was administered in the Netherlands, where government response differed considerably from many other countries and, in particular, was much less stringent. It remains unknown whether people in other countries, with different cultures, would have behaved similarly under similar conditions.

5. Conclusion

Overall, our results support the idea to take consideration of others and consideration of the future into account when analyzing cooperative behavior in social dilemmas. We found considerations of others and consideration of the future to be positively correlated and to jointly predict compliance with voluntary precautionary measures concerning social distancing and personal hygiene recommended by the government in the Netherlands to help contain the spread of COVID-19. Thus, we recommend policy makers who have to deal with social dilemmas, to consider the public's consideration of others and their consideration of the future when designing and communicating policies.

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Author's contributions

KR, MvH and JvE developed the survey and were responsible for the data collection. MvH analyzed the data and KR and JvE contribute to interpretation of the data. MvH wrote the initial draft and KR and JvE contributed to finalizing the manuscript. All authors reviewed and approved the final version of the manuscript.

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