

van Hulsen, M.A.J.; Rohde, Kirsten I.M.; van Exel, N.J.A.

## Working Paper

# Intertemporal and Social Preferences predict cooperation in a Social Dilemma: An application in the context of COVID-19

Tinbergen Institute Discussion Paper, No. TI 2020-047/I

## Provided in Cooperation with:

Tinbergen Institute, Amsterdam and Rotterdam

*Suggested Citation:* van Hulsen, M.A.J.; Rohde, Kirsten I.M.; van Exel, N.J.A. (2020) : Intertemporal and Social Preferences predict cooperation in a Social Dilemma: An application in the context of COVID-19, Tinbergen Institute Discussion Paper, No. TI 2020-047/I, Tinbergen Institute, Amsterdam and Rotterdam

This Version is available at:

<https://hdl.handle.net/10419/229667>

### Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

### Terms of use:

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

TI 2020-047/I  
Tinbergen Institute Discussion Paper

# Intertemporal and Social Preferences predict cooperation in a Social Dilemma: An application in the context of COVID-19

**Revision: October 2020**

*M.A.J. van Hulsen<sup>1</sup>*

*K.I.M. Rohde<sup>1</sup>*

*N.J.A. van Exel<sup>2</sup>*

<sup>1</sup> Erasmus School of Economics, Erasmus University Rotterdam

<sup>2</sup> Erasmus School of Health Policy & Management, Erasmus University Rotterdam

Tinbergen Institute is the graduate school and research institute in economics of Erasmus University Rotterdam, the University of Amsterdam and Vrije Universiteit Amsterdam.

Contact: [discussionpapers@tinbergen.nl](mailto:discussionpapers@tinbergen.nl)

More TI discussion papers can be downloaded at <https://www.tinbergen.nl>

Tinbergen Institute has two locations:

Tinbergen Institute Amsterdam  
Gustav Mahlerplein 117  
1082 MS Amsterdam  
The Netherlands  
Tel.: +31(0)20 598 4580

Tinbergen Institute Rotterdam  
Burg. Oudlaan 50  
3062 PA Rotterdam  
The Netherlands  
Tel.: +31(0)10 408 8900

# Intertemporal and Social Preferences predict cooperation in a Social Dilemma: An application in the context of COVID-19.

M.A.J. (Merel) van Hulsen<sup>\*a,b</sup>, K.I.M. (Kirsten) Rohde<sup>a,b,c</sup> & N.J.A. (Job) van Exel<sup>a,c,d</sup>

\* corresponding author. E-mail addresses: vanhulsen@ese.eur.nl (M.A.J. van Hulsen), rohde@ese.eur.nl (K.I.M. Rohde), vanexel@eshpm.eur.nl (N.J.A. van Exel).

<sup>a</sup> Erasmus School of Economics, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands

<sup>b</sup> Erasmus Research Institute of Management, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands

<sup>c</sup> Tinbergen Institute, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands

<sup>d</sup> Erasmus School of Health Policy & Management, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands

## Abstract

In this paper, we examine the role of intertemporal and social preferences in explaining cooperation in a social dilemma. In the Netherlands, the COVID-19 pandemic raised an acute social dilemma when the government opted for an “intelligent lockdown” to contain the spread of the virus, based on moral appeals and self-discipline rather than repression. Hence, citizens had to decide whether or not to comply with the precautionary measures recommended by the government. Through an online survey, using a general population sample of 1,019 adult citizens of the Netherlands, we measured people’s consideration of future consequences (CFC), consideration of others (COO) and compliance with the precautionary measures recommended by the government. We find that both an increase in COO and an increase in CFC are associated with an increased compliance with the precautionary measures. Moreover, the marginal effects of COO and CFC are lower for higher values of CFC and COO, respectively. Overall, COO appears to have the largest influence on compliance. In addition to these two variables, gender, age, perceived risk for others, perceived compliance by others and opinion about government response to the pandemic had a significant effect on compliance. These findings emphasize the importance of both social as well as intertemporal preferences in the prediction of cooperation in social dilemmas.

JEL Codes: D91; I12; I18

Keywords: social preferences; time preferences; social dilemma; health; behavior; COVID-19

## 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 temporal consequences of their actions. Two important factors that could thus determine a person's predisposition to cooperate, are social and intertemporal preferences (Parks et al., 2013).

Social preferences have 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 intertemporal preferences also matter. More specifically, when 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). Hence, social and intertemporal preferences might thus be important joint determinants of people's behavior in the context of social dilemmas.

This paper investigates whether people's social preferences, measured by their Consideration of Others (COO) (Weinberger & Schwartz, 1990), and intertemporal preferences, measured by their Consideration of Future Consequences (CFC) (Joireman et al., 2012; Strathman et al., 1994), predict their behavior in an acute social dilemma raised by the COVID-19 pandemic. 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 puts 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 1.5m 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 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, cough or sneeze in elbow, and wash hands thoroughly and regularly (National Institute for Public Health and the Environment (RIVM), 2020), but, for example, not the use of face masks. See Appendix A for a complete overview of the measures in the Netherlands at the time of the data collection. This response to the COVID-19 pandemic corresponded with a score of 73.2 out of a possible 100 on the Government Response Stringency Index, and ranking the Netherlands as the 97th strictest country from the 177 indexed countries at that time (Hale et al., 2020).

According to Kirchler (2020), the COVID-19 pandemic can be put into the “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” is not focused on repression, compliance with the precautionary measures recommended by the government is discretionary. Similar to other social dilemmas, the individual decision whether or not to comply has 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 and preventing overburdening of the health care system. Higher concerns for others are therefore likely to be associated with higher compliance with recommended behavior. Compliance is also likely to be associated with concerns for the future, because it can be seen as preventative health behavior, which people with higher consideration of future consequences are more likely to engage in (e.g. Crockett et al, 2009; Dorr et al., 1999; Orbell et al., 2004).

The main contribution of this paper is that it investigates the joint role of social preferences (COO) and intertemporal preferences (CFC) in the context of a social dilemma. Social and intertemporal preferences

are likely to interact, because they both relate to psychological distance (social and temporal) and have been shown to be cognitively related (Trope and Liberman, 2010). Nevertheless, previously these two preferences have mostly been examined separately (e.g. Cameron et al., 1998; Bailliet et al., 2009; Zhao, Villagran et al., 2012). Exceptions can be found within 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). Notwithstanding, little is known about the interaction between these preferences and their relationship with cooperation in the context of social dilemmas. The need for this type of research was also emphasized by Parks (2015). This study aims to investigate the relation of concerns for others and for the future and their interaction, with compliance behavior during the COVID-19 pandemic.

In the last week of March 2020, 1,019 adult citizens of the Netherlands quota-sampled to be representative in terms of age, gender and education level, 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. 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 participants 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 investigate the relation between these two constructs and whether their interaction contributes to explaining compliance behavior.

Results from our analysis show that both social and temporal considerations significantly increase self-reported compliance with the recommended precautionary measures. The effect of their interaction is negative, suggesting that the marginal effects of COO and CFC are lower for higher values of CFC and COO respectively. Moreover, COO appears to have more explanatory power than CFC. Apart from this, gender and age also had a significant effect on compliance, with being female and having a higher age being

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 significantly increases compliance. An increase in perceived compliance by others also positively related to compliance. Additionally, deeming the government response to the pandemic as insufficient led to more compliance whereas deeming it exaggerated led to less compliances compared to individual who were neutral in their opinion on government response. Overall, the results support the importance of looking at temporal as well as social preferences in the context of social dilemmas.

Our results are not only relevant from a scientific perspective, but also from a policy perspective. The COVID-19 pandemic put many countries in a sudden state of crisis. The response of the government of the Netherlands to the pandemic was unique in that it imposed mainly discretionary measures, thereby relying strongly on citizens' individual responsibility and cooperation. Knowing which factors play a role in compliance with such measures under these circumstances can yield useful insights for optimizing policy response in case of a second peak in COVID-19 cases, a future pandemic, or any other situations that require (acute) collective action. So far, two other studies have looked at compliance behavior in the Netherlands during the COVID-19 pandemic (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. This study adds by looking at a broader set of recommended precautionary measures, and by studying compliance from a social dilemma perspective.

## 2. Methods

### 2.1 Data

The data used for this paper is part of a larger survey for which the data was collected from the 27<sup>th</sup> till the 30<sup>th</sup> of March 2020, one month after the first confirmed case of COVID-19 in the Netherlands, using an online survey sampling company in the Netherlands. The sample consists of 1,019 adult citizens of the Netherlands, quota-sampled to be representative of the adult population of the Netherlands with respect to age, gender and education level. 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 social and intertemporal preferences.

## 2.2 Intertemporal preferences

We measured intertemporal preferences 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=0) to 'extremely characteristic' (score=4).

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 they are concerned with both. This two-factor approach is also supported by several other studies (Adams, 2012; Joireman et al., 2008; Petrocelli, 2003; Rappange et al., 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). Apart from this, Webley & Nyhus (2005) have looked at the relation between future orientation in parents and their children, showing that the economic behavior of children as they become adults is weakly but clearly impacted by the temporal orientation of their parents.

## Social preferences

We measured social preferences with the 7-item Consideration of Others (COO) scale, a subscale of Weinberger's self-restraint scale and part of the Weinberger Adjustment Inventory. This inventory aims to measure emotional distress and self-restraint, 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=0) to 'True' (score=4) scale and the other five items are scored on a 5-point 'Almost Never' (score=0) to 'Almost Always' (score =4) scale. To calculate the total COO-score, scores on the 7 items are added, with higher scores indicating higher consideration of others.

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 et al. (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).

### 2.3 Compliance with the personal measures

To assess the compliance with the prevailing precautionary measures, we asked eight questions concerning the recommended COVID-19 related behaviors (see appendix A): 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' to 'always' and the latter four are answered on a 4-point scale ranging from 'no' to 'yes, always'. These eight items are standardized to a score ranging from 0 to 10 and then summed, leading to a total score for compliance ranging between 0 and 80 (*Cronbach's alpha* = 0.79).

It is 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, 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 total compliance score as mentioned above concern the precautionary measures.

### Control variables

Several variables are used as control variables. These variables include 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.

Similar to the self-assessed compliance, respondents were also asked whether they believe other citizens of the Netherlands comply with the eight above-mentioned precautionary measures. Scoring is also the

same, resulting in a score for perceived compliance by others ranging between 0 and 80 (*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' to 'extremely high risk'. Apart from this, 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 is 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 also asked respondents' opinion 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' to 'highly insufficient'. 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' to 'highly effective'.

### 3. Results

#### 3.1 Descriptive Statistics

Table 1 and Figure 1 summarize the control variables used in this research. 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

|  | <b>Variable</b>        | <b>Category</b>       | <b>Frequency</b> |
|--|------------------------|-----------------------|------------------|
|  | <i>Gender</i>          | Female                | 542 (53.19%)     |
|  |                        | Male                  | 477 (46.81%)     |
|  | <i>Age</i>             | 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%)     |
|  | <i>Education level</i> | Low                   | 288 (28.26%)     |
|  |                        | Middle                | 370 (36.31%)     |
|  |                        | High                  | 361 (35.43%)     |
| <i>Opinion about government response</i>                                 |                        | Very exaggerated      | 31 (3.04%)       |
|  |                        | Somewhat exaggerated  | 65 (6.38%)       |
|  |                        | Fitting               | 657 (64.47%)     |
|  |                        | Somewhat insufficient | 208 (20.41%)     |
|  |                        | Highly insufficient   | 58 (5.69%)       |
| <i>Opinion about effectiveness of general and precautionary measures</i> |                        | 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%)       |

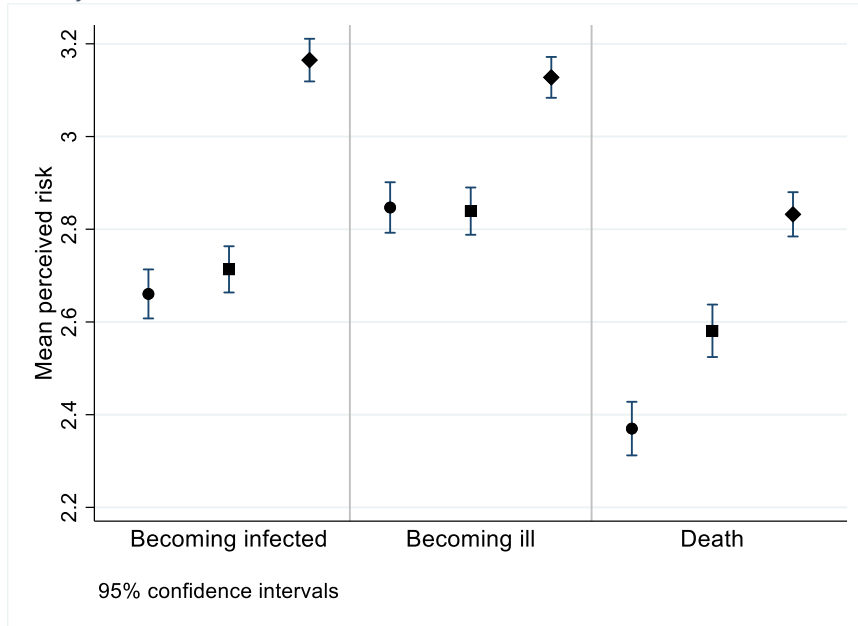
Table 1 also shows that 64.5 percent of our sample believes that the government response to the COVID-19 pandemic was fitting, 9.4 percent believes the reaction was exaggerated, and 26.1 percent believes the government should have done more. Additionally, 56.2 percent of the sample believes that the 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 Appendix B). Since the focus of this paper lies on the effect of social preferences, 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 for others was 1.88, which was statistically significantly higher ( $p < 0.00$ ).<sup>1</sup>

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). The CFC-total scale is of acceptable internal consistency, with a Cronbach’s alpha of 0.72. Nevertheless, our data supports 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

<sup>1</sup> The use of these variables as two scales is justified by the PCA analysis. For perceived risk for self, all three variables load on the first component with an Eigenvalue of 2.11; the Kaiser-Meyer-Olkin measure of sampling adequacy equals 0.63. For perceived risk for others, the six variables mainly load on the first component with an Eigenvalue of 3.6, and on the second component with an Eigenvalue of 1.04, thus barely passing the threshold of 1; the Kaiser-Meyer-Olkin measure of sampling adequacy equals 0.77

CFC-future score, but women score significantly lower on the CFC-immediate score (13.9 versus 15.1,  $t = 3.87$ ,  $p=0.00$ ). Age is significantly negatively correlated with CFC-future ( $\rho = -0.14$ ,  $p = 0.00$ ), but not with CFC-immediate ( $\rho = 0.03$ ,  $p = 0.38$ ). Moreover, higher educated are less immediate-oriented and more future-oriented than lower educated (CFC-immediate: low education level = 16.2, middle = 14.6, high = 12.9,  $\chi^2 = 75.0$ ,  $p = 0.00$ ; CFC-future: low education level = 16.0, middle = 16.4, high = 17.6,  $\chi^2 = 29.8$ ,  $p = 0.00$ )

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 (19.5 versus 18.1,  $t = -5.11$ ,  $p = 0.00$ ). COO does not differ for different education levels ( $\chi^2 = 0.36$ ,  $p = 0.84$ ) and is also not correlated with age ( $\rho = 0.05$ ,  $p = 0.08$ ).

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 ( $\rho = 0.35$ ,  $p = 0.000$ ) as are COO and CFC-total ( $\rho = 0.24$ ,  $p = 0.000$ ). This reinforces the findings from Trope and Liberman (2010) that social and temporal distance are cognitively related.

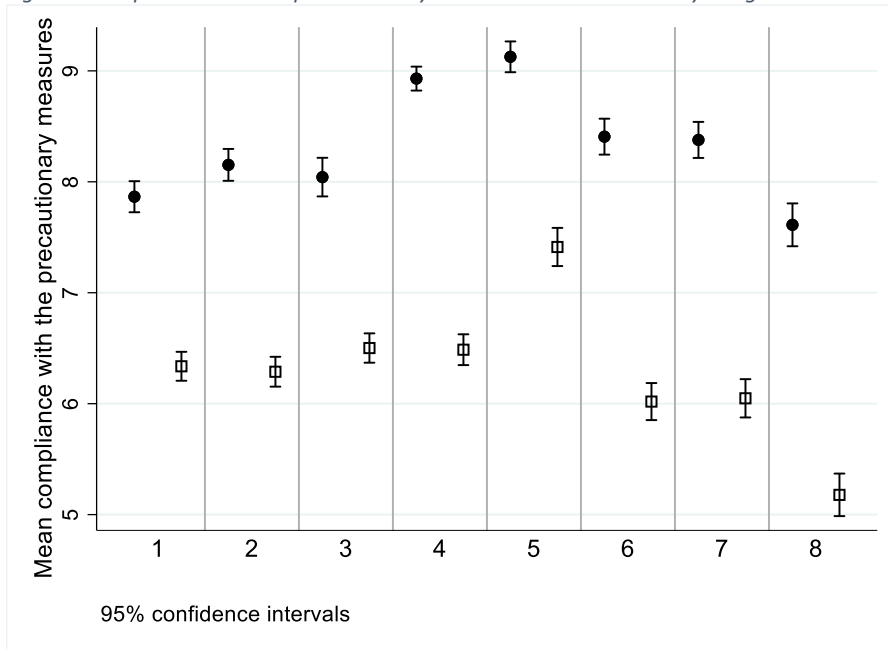
To simplify the interpretation of the coefficients in our regression analyses, the COO as well as the CFC-total, CFC-future and CFC-immediate scales are rescaled to range from 0 to 1.

### 3.3 Compliance with the personal measures

Figure 2 shows that compliance with the precautionary measures recommended by the government is high, with standardized compliance on average between 7.6 and 9.1 on a scale from 0 to 10. In total, the median compliance equals 70 on a scale from 0 to 80 (*mean* 66.5, *S.D.* 12.86). This high level of compliance is also found in the other papers on COVID-19 compliance in the Netherlands (Folmer et al. 2020; Kuiper et al., 2020). Interestingly, respondents on average believe that they comply better than other citizens of the Netherlands, both when looking at the individual measures and the total compliance score. For others, the median total compliance equals 50.8 on a scale from 0 to 80 (*mean* 50.27, *S.D.* 13.95).

The data shows 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.

Figure 2 Compliance with the precautionary measures recommended by the government



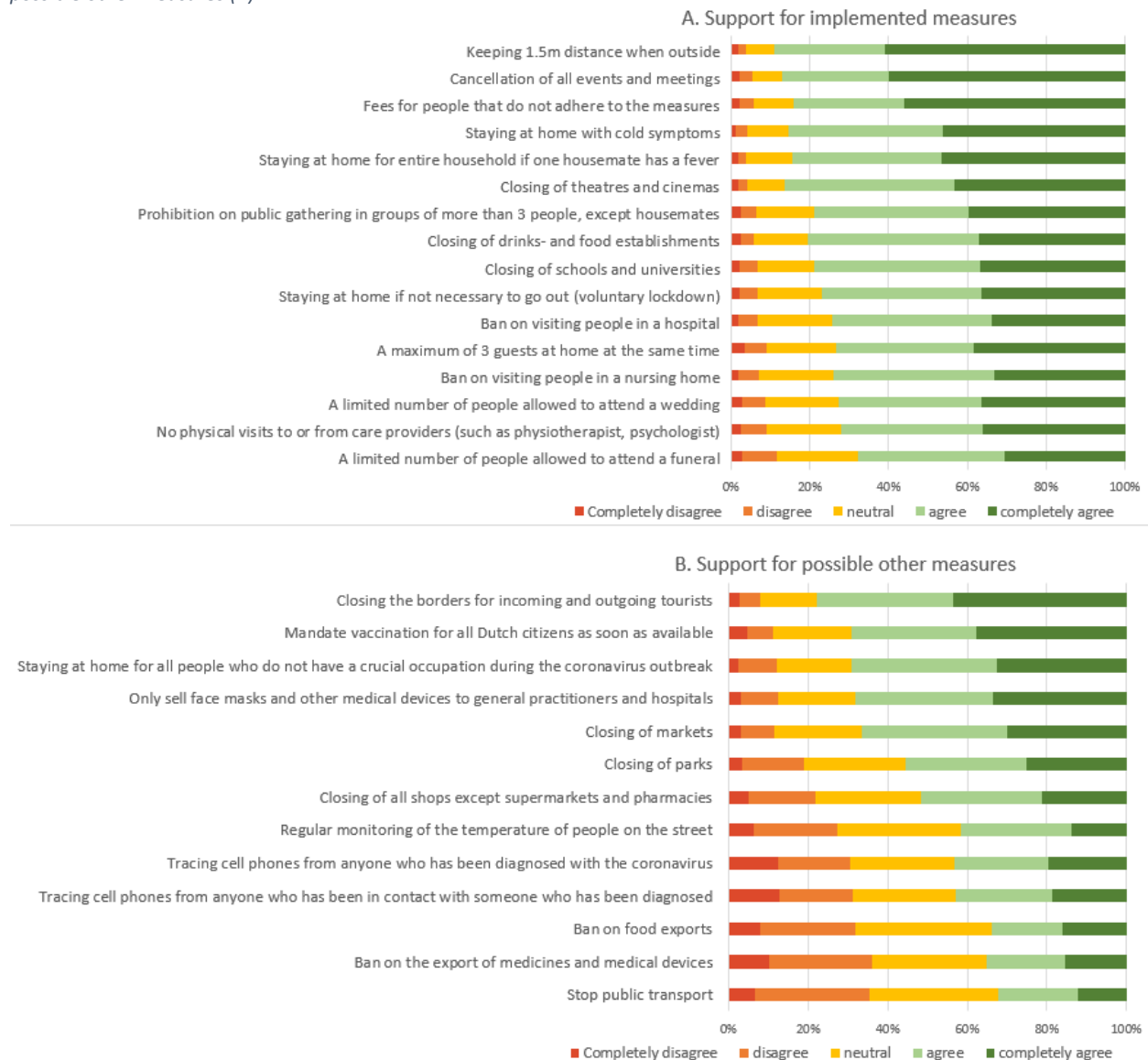
Note: For each of the precautionary measures the black circle shows the average self-reported compliance of respondents, while the square shows how well the respondents believe others comply with the measures.

The 8 precautionary measures 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).

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 one of the measures. Women report a higher compliance than men ( $\chi^2 = 62.96, p = 0.00$ ). Compliance also increases with age (*Pearson*  $\chi^2 = 23.83, p = 0.00$ ), which is perhaps not surprising since COVID-19 is increasingly dangerous for 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 collective goals.

One factor that could explain why overall compliance is high, is the public support for the general and precautionary measures. As Figure 3A shows, respondents showed high support for measures that were in place in the Netherlands at the time of the data collection, moderate support for measures that neighboring countries had implemented (items 1, 3, 5, 6 and 7 in Figure 3B) and little support for measures that no country at that point had implemented. The “intelligent lockdown” thus seems to be supported by the respondents.

Figure 3 Support for general and precautionary measures implemented in the Netherlands at the time of the survey (A) and possible other measures (B)



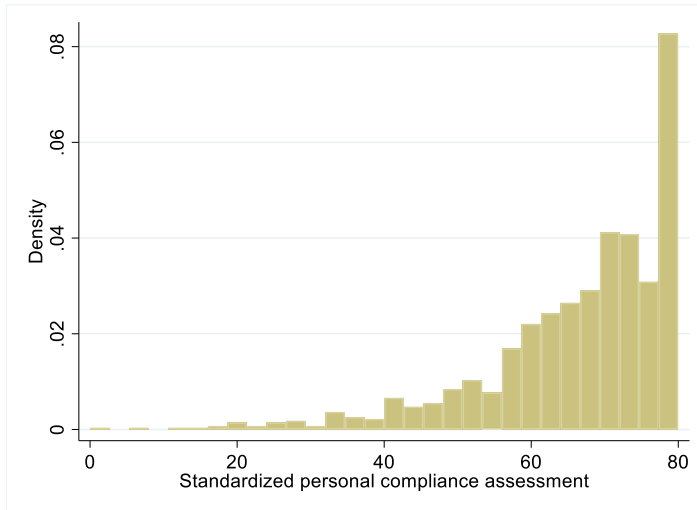
### 3.4 Full compliers versus partial or non-compliers

As mentioned in section 3.3, 159 respondents answered that they fully comply with all the eight precautionary measures. This causes a peak in the distribution of the compliance variable (see Figure 4). Table 2 provides summary statistics for the group of full compliers and the remaining respondents. Wilcoxon rank-sum tests showed that the two sub-samples differ significantly on a number of characteristics. The full-compliance group consists of more females, is older and lower educated. In addition, they believe the measures to be more effective and the government response to the pandemic more insufficient than the other respondents.



Interestingly, within the full-compliance group the perceived risk of death from COVID-19 for self and for others is significantly higher. Fear of death might thus be a better predictor of compliance behavior than risk of becoming infected or ill. Additionally, the perceived risk for others of becoming ill or dying from COVID-19 is higher in the group of full-compliers than in the other group.

Figure 4 Density curve of personal compliance with personal measures



Most importantly here, COO and CFC (total and future) are significantly higher in the full-compliers group than in the other group. The difference in COO between the full compliers and the others is in the expected direction, where individuals who are more concerned about the effects of their actions on others are also more likely to fully comply with the precautionary measures. Both the CFC-total scale and the CFC-future subscale are also significantly higher in the group of full compliers than in the other group, but the CFC-immediate scale is not significantly different between groups. Since the main focus of this paper lies on the relation between future orientation, consideration of others, and compliance, in the remainder we will focus on the CFC-future subscale, and report results regarding the total and immediate scales separately in Appendix C (table 6).

Table 2 Difference between full compliers and remaining sample

|  | Full compliers (n=159) |        | Others (n=860) |        | Significance |         |
|--|------------------------|--------|----------------|--------|--------------|---------|
|  | Mean                   | S.D.   | Mean           | S.D.   | Z-score      | P-value |
| Consideration of others                          | 0.730                  | 0.167  | 0.663          | 0.148  | 4.969        | 0.000   |
| Consideration of future consequences – total     | 0.562                  | 0.115  | 0.537          | 0.114  | 2.556        | 0.011   |
| Consideration of future consequences – future    | 0.626                  | 0.147  | 0.592          | 0.143  | 2.413        | 0.016   |
| Consideration of future consequences – immediate | 0.500                  | 0.202  | 0.518          | 0.174  | -1.454       | 0.146   |
| Gender   | 0.698                  | 0.461  | 0.501          | 0.500  | 4.570        | 0.000   |
| Age  | 50.642                 | 14.915 | 47.262         | 16.323 | 2.361        | 0.018   |
| Education  | 1.937                  | 0.785  | 2.097          | 0.795  | -2.334       | 0.020   |
| Self-assessed health                             | 7.038                  | 1.676  | 7.098          | 1.550  | -0.555       | 0.578   |
| Personal risk of getting infected                | 2.717                  | 0.929  | 2.650          | 0.847  | 0.626        | 0.531   |
| Personal risk of becoming ill                    | 2.937                  | 0.932  | 2.830          | 0.877  | 1.312        | 0.189   |
| Personal risk of death                           | 2.560                  | 1.053  | 2.335          | 0.914  | 2.617        | 0.009   |
| Risk of getting infected for loved ones          | 2.774                  | 0.927  | 2.702          | 0.787  | 0.759        | 0.448   |
| Risk of becoming ill for loved ones              | 2.899                  | 0.949  | 2.828          | 0.805  | 0.623        | 0.534   |
| Risk of death for loved ones                     | 2.711                  | 1.051  | 2.557          | 0.892  | 1.815        | 0.070   |
| Risk of getting infected for other citizens      | 3.289                  | 0.741  | 3.142          | 0.748  | 2.349        | 0.019   |
| Risk of becoming ill for other citizens          | 3.321                  | 0.732  | 3.092          | 0.709  | 3.868        | 0.000   |
| Risk of death for other citizens                 | 3.038                  | 0.762  | 2.794          | 0.774  | 3.753        | 0.000   |
| Compliance by others                             | 55.199                 | 16.331 | 49.360         | 13.280 | 4.527        | 0.000   |
| Opinion government response                      | 3.352                  | 0.730  | 3.164          | 0.764  | 2.871        | 0.004   |
| Opinion effectiveness of measures                | 3.610                  | 0.954  | 3.457          | 0.853  | 2.185        | 0.029   |

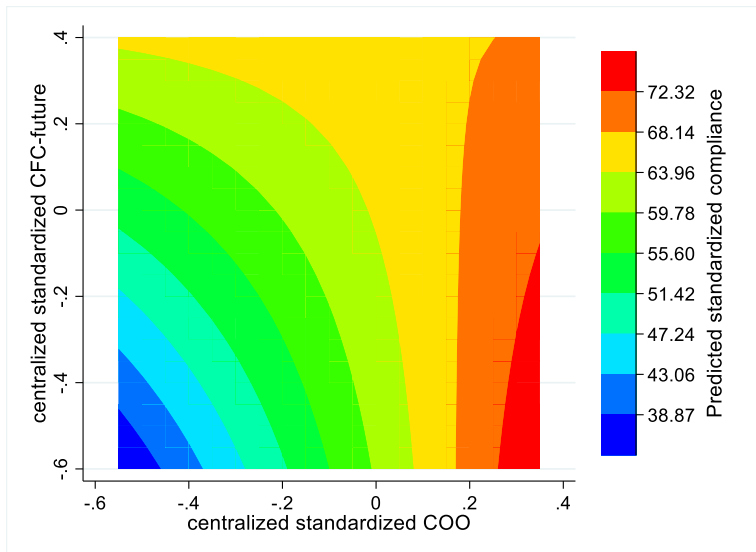
### 3.5 Determinants of compliance with the COVID-19 personal measures

Table 3 lists the results of regressing the self-reported compliance score on multiple individual characteristics, excluding the group of full compliers. This resulted in 860 observations as compared to the initial 1,019. The group of full compliers is excluded from this analysis to reduce the skewedness of the data (results including the full sample can be found in Appendix C, Table 7). Because the data on compliance is skewed (see Figure 4), we also analyzed the data using a log-transformation. This analysis (results not presented, available upon request) produced similar general results and implications, therefore we present the results of the untransformed compliance scores as the interpretation of coefficients is more straightforward. To account for heteroskedasticity, robust standard errors were used in the regression models. Moreover, as some of our estimated models (3 to 8) include an interaction term, we centralized the COO and CFC-future scores to account for multicollinearity.

Models 1-3 in Table 3 show that both COO and CFC-future have a statistically significant positive effect on compliance. The effect of their interaction is also significant but negative, suggesting that the marginal effects of COO and CFC are lower for higher values of CFC and COO respectively. Figure 5 illustrates that for low values of COO, the CFC-future score is relevant in determining the level of compliance, with higher levels of CFC-future relating to higher level of compliance. For higher scores of COO, the CFC-future score becomes less predictive of compliance. Overall, COO explains more of the variance in compliance than CFC-future (respectively 9 and 3 percent). The effect of CFC-future is robust also when the complete CFC scale is used, although the interaction becomes insignificant (Appendix C, table 5). This may be due to the insignificant interaction between COO and CFC-immediate (Appendix C, table 6).

Model 4 of Table 3 includes the demographics on which we sampled. In line with Table 2, 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. 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. In contrast to Table 2, model 4 shows that education has no impact on compliance.

Figure 5 Contour plot of predicted compliance with the personal measures, model 3



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 opinion about government response and the effectiveness of the general and individual precautionary measures are added. People who deem the government response insufficient, comply significantly more as compared to individuals who find the reaction fitting. People who think the response is exaggerated comply significantly and substantially less, with an average compliance score that is 10.2 points lower than people who see the response as fitting, *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 deem the measures effective.

Finally, all these variables are combined in model 8. This results in an  $R^2$  of 0.35, 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 (see model 4), 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 in model 7.

Interestingly, the results of model 8 align with those of Table 2, in the sense that the variables that are positively associated with compliance in model 8, also took on larger values for the group of full compliers in Table 2. One exception is education, which did not show a significant effect in model 8 but was significantly different between the group of full- compared to partial compliers. Nevertheless, regressing model 8 on the full sample, thus adding the full compliers, leads to similar conclusions as with the partial sample (see Appendix C, table 7).

Table 3 Regressions with robust standard errors of compliance with personal measures, excluding the full compliers.

|  | Model 1            | Model 2            | Model 3             | Model 4             | Model 5             | Model 6             | Model 7             | Model 8             |
|--|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1. COO   | 24.73***<br>(3.18) |                    | 21.12***<br>(3.13)  | 15.63***<br>(3.05)  | 14.78***<br>(2.94)  | 10.96***<br>(2.86)  | 14.22***<br>(2.84)  | 10.40***<br>(2.78)  |
| 2. CFC-future  |                    | 15.72***<br>(3.31) | 6.82**<br>(3.29)    | 11.82***<br>(3.31)  | 12.03***<br>(3.26)  | 7.96**<br>(3.07)    | 9.86***<br>(3.04)   | 6.68**<br>(2.86)    |
| 3. COO × CFC-future                                    |                    |                    | -42.23**<br>(19.48) | -38.02**<br>(18.52) | -39.72**<br>(18.85) | -40.43**<br>(17.95) | -35.83**<br>(16.65) | -38.08**<br>(16.33) |
| 4. Female  |                    |                    |                     | 4.79***<br>(0.78)   | 4.67***<br>(0.78)   | 4.47***<br>(0.74)   | 3.95***<br>(0.74)   | 3.78***<br>(0.71)   |
| 5. Age   |                    |                    |                     | 0.19***<br>(0.03)   | 0.18***<br>(0.03)   | 0.17***<br>(0.03)   | 0.16***<br>(0.03)   | 0.14***<br>(0.03)   |
| 6. Education level: base low                           |                    |                    |                     |                     |                     |                     |                     |                     |
| Middle   |                    |                    |                     | 1.16<br>(1.07)      | 1.34<br>(1.07)      | 1.35<br>(1.00)      | 0.82<br>(1.01)      | 1.07<br>(0.95)      |
| High   |                    |                    |                     | 0.35<br>(1.19)      | 0.66<br>(1.18)      | 1.11<br>(1.10)      | 0.06<br>(1.13)      | -0.84<br>(1.07)     |
| 7. Perceived risk for self                             |                    |                    |                     |                     | 2.22***<br>(0.62)   |                     |                     | -0.34<br>(0.67)     |
| 8. Poor self-assessed health (<6/10)                   |                    |                    |                     |                     | 0.87<br>(1.22)      |                     |                     | 0.84<br>(1.18)      |
| 9. Opinion about compliance others                     |                    |                    |                     |                     |                     | 0.24***<br>(0.03)   |                     | 0.22***<br>(0.03)   |
| 10. Perceived risk for others                          |                    |                    |                     |                     |                     | 4.78***<br>(0.79)   |                     | 4.26***<br>(0.97)   |
| 11. Government response to pandemic: base fitting      |                    |                    |                     |                     |                     |                     |                     |                     |
| Insufficient   |                    |                    |                     |                     |                     |                     | 2.90***<br>(0.93)   | 2.45***<br>(0.90)   |
| Exaggerated  |                    |                    |                     |                     |                     |                     | -10.15***<br>(1.55) | -8.93***<br>(1.38)  |
| 12. Opinion about effectiveness measures: base neutral |                    |                    |                     |                     |                     |                     |                     |                     |
| Effective  |                    |                    |                     |                     |                     |                     | 1.16<br>(0.86)      | 1.10<br>(0.81)      |
| Ineffective  |                    |                    |                     |                     |                     |                     | -2.96**<br>(1.44)   | -2.04<br>(1.41)     |
| (Constant)   | 64.02***<br>(0.41) | 64.02***<br>(0.42) | 64.34***<br>(0.42)  | 52.41***<br>(2.08)  | 49.11***<br>(2.43)  | 32.65***<br>(3.37)  | 54.61***<br>(2.05)  | 36.58***<br>(3.27)  |
| Obs  | 860                | 860                | 860                 | 860                 | 860                 | 860                 | 860                 | 860                 |
| R-squared  | 0.09               | 0.03               | 0.10                | 0.19                | 0.21                | 0.29                | 0.28                | 0.35                |
| F  | 60.66              | 22.55              | 21.88               | 21.74               | 17.99               | 25.73               | 21.31               | 22.06               |
| Root MSE   | 11.95              | 12.30              | 11.88               | 11.31               | 11.20               | 10.61               | 10.69               | 10.13               |
| AIC  | 6710.07            | 6759.11            | 6701.85             | 6620.67             | 6605.55             | 6512.00             | 6527.30             | 6438.36             |
| Mean VIF   | 1.00               | 1.00               | 1.12                | 1.28                | 1.24                | 1.25                | 1.27                | 1.36                |

\* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . COO and CFC are standardized and centralized to avoid multicollinearity with the interaction term. Robust standard errors between parentheses.

#### 4. Discussion

The aim of this study was to test the hypothesis that social and intertemporal preferences 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' social preferences (COO), temporal preferences (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 intertemporal preferences are relevant for cooperation in social dilemmas. Interestingly, the marginal effects of COO and CFC-future decline as CFC-future and COO increase, respectively. We also found a significant positive correlation between COO and CFC-future. This paper thereby supports previous evidence from Trope and Liberman (2010) that social and temporal distance are forms of psychological distance that have a common impact on perceptions and behavior. People who care more about their own, temporally distant, future also care more about others and vice versa.

Our findings that social and future orientation are both important predictors of behavior in a social dilemma concerning health echoes with findings in environmental sciences where the role of social and future orientation has been acknowledged before (e.g. Joireman et al., 2001; Khachatryan et al., 2013). Notwithstanding, little is known about the interaction between social and future orientation in the context of social dilemmas. We show that in a social dilemma in a health setting, the interaction between both orientations is negative, implying that future orientation and social orientation are, at least to some extent, substitutes in predicting cooperative behavior in social dilemmas. Future and social orientation are not perfect substitutes, though. 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 social

preferences. Using incentivized measures of social preferences and health behaviors, Campos-Mercade et al. (2020) also found that social preferences can predict health behaviors during the COVID-19 pandemic, while studying the effects in Sweden.

Apart from social and future orientation, 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. On the other hand, it could 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.

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). 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. Balliet & Joireman (2010), for instance, argued that the self-control needed for compliance might result in less compliance as the moral appeal to comply to the precautionary measures continues over a longer period, or is repeated after relaxing the measures for a certain period (e.g., between the first and potential second peak). If compliance is necessary for a longer period of time, ego depletion might reduce people's social concerns, which could cause them to behave more selfishly and comply less. Therefore, if compliance is expected for a longer period or if a second peak in contaminations would occur, compliance might decrease and may be driven by different psychological motives. Further research is needed to assess the 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 social as well as intertemporal preferences into account when analyzing cooperative behavior in social dilemmas. We found social and future orientation 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 both the social and the future orientations of the public when designing and communicating policies.

### **Funding & Ethical Approval**

We acknowledge the financial support of the Erasmus Trust Fund and Erasmus Research Institute of Management to enable the data collection. The funding sources were not involved in the study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. The research has been approved by the Internal Review Board of the Erasmus School of Economics (*ESE IRB-NE application 2020-04*).

Declarations of interest: none.

## References

- Adams, J. (2012). Consideration of immediate and future consequences, smoking status, and body mass index. *Health Psychology, 31*, 260-263. doi:10.1037/a0025790
- Balliet, D., Parks, C., & Joireman, J. (2009). Social value orientation and cooperation in social dilemmas: A meta-analysis. *Group Processes & Intergroup Relations, 12*(4), 533-547.
- Balliet, D., & Joireman, J. (2010). Ego depletion reduces proselves' concern with the well-being of others. *Group Processes & Intergroup Relations, 13*(2), 227-239.
- Biel, A., & Thøgersen, J. (2007). Activation of social norms in social dilemmas: A review of the evidence and reflections on the implications for environmental behaviour. *Journal of economic psychology, 28*(1), 93-112.
- Cameron, L. D., Brown, P. M., & Chapman, J. G. (1998). Social Value Orientations and Decisions to Take Proenvironmental Action. *Journal of Applied Social Psychology, 28*(8), 675-697.
- Campos-Mercade, P., Meier, A., Schneider, F., & Wengström, E. (2020). Prosociality predicts health behaviors during the COVID-19 pandemic. *University of Zurich, Department of Economics, Working Paper*, (346).
- Capstick, S. B. (2013). Public understanding of climate change as a social dilemma. *Sustainability, 5*(8), 3484-3501.
- Centraal Bureau Statistiek (2020), Bevolking op 1 januari en gemiddeld; geslacht, leeftijd en regio. Retrieved on August 26, 2020 from <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/03759ned/table?fromstatweb>
- Charness, G., & Rabin, M. (2002). Understanding social preferences with simple tests. *The Quarterly Journal of Economics, 117*(3), 817-869.
- Caporaso, J. A. (2018). Europe's triple crisis and the uneven role of institutions: The euro, refugees and brexit. *JCMS: Journal of Common Market Studies, 56*(6), 1345-1361.
- Crockett, R. A., Weinman, J., Hankins, M., & Marteau, T. (2009). Time orientation and health-related behavior: Measurement in general population samples. *Psychology and Health, 24*, 333-350. doi:10.1080/08870440701813030
- Dorr, N., Krueckeberg, S., Strathman, A., & Wood, M. D. (1999). Psychosocial correlates of voluntary HIV antibody testing in college students [Abstract]. *AIDS Education and Prevention, 11*, 14-27.
- Englmaier, F., & Gebhardt, G. (2016). Social dilemmas in the laboratory and in the field. *Journal of Economic Behavior & Organization, 128*, 85-96.
- Farrell, A. D., & Sullivan, T. N. (2000). Structure of the Weinberger Adjustment Inventory Self-Restraint Scale and its relation to problem behaviors in adolescence. *Psychological Assessment, 12*, 394-401.

- Folmer, C. R., Kuiper, M., Olthuis, E., Kooistra, E. B., de Bruijn, A. L., Brownlee, M., ... & van Rooij, B. (2020). Compliance in the 1.5 Meter Society: Longitudinal Analysis of Citizens' Adherence to COVID-19 Mitigation Measures in a Representative Sample in the Netherlands.
- Government of the Netherlands (2020). Stricter measures to control coronavirus. Retrieved from <https://www.government.nl/latest/news/2020/03/23/stricter-measures-to-control-coronavirus>.
- Gueye, M., Quérou, N., & Soubeyran, R. (2020). Social preferences and coordination: An experiment. *Journal of Economic Behavior & Organization*, 173, 26-54.
- Hale, T., Webster, S., Petherick, A., Phillips, T., and Kira, B. (2020). Oxford COVID-19 Government Response Tracker, *Blavatnik School of Government*. Data use policy: Creative Commons Attribution CC BY standard.
- de Haas, M., Faber, R., & Hamersma, M. (2020). How COVID-19 and the Dutch 'intelligent lockdown' change activities, work and travel behaviour: Evidence from longitudinal data in the Netherlands. *Transportation Research Interdisciplinary Perspectives*, 100150.
- Hevey, D., Perti, M., Thomas, K., Maher, L., Craig, A., & Chuinneagain, S. N. (2010). Consideration of future consequences scale: Confirmatory factor analysis. *Personality and Individual Differences*, 48, 654-657. doi:10.1016/j.paid.2010.01.006
- Jacquet, J., Hagel, K., Hauert, C., Marotzke, J., Röhl, T., & Milinski, M. (2013). Intra-and intergenerational discounting in the climate game. *Nature climate change*, 3(12), 1025-1028.
- Joireman, J., Balliet, D., Sprott, D., Spangenberg, E., & Schultz, J. (2008). Consideration of future consequences, ego-depletion, and self-control: Support for distinguishing between CFC Immediate and CFC-Future sub-scales. *Personality and Individual Differences*, 45, 15-21. doi:10.1016/j.paid.2008.02.011
- Joireman, J., Posey, D. C., Truelove, H. B., & Parks, C. D. (2009). The environmentalist who cried drought: Reactions to repeated warnings about depleting resources under conditions of uncertainty. *Journal of Environmental Psychology*, 29(2), 181-192.
- Joireman, J. A., Lasane, T. P., Bennett, J., Richards, D., & Solaimani, S. (2001). Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour. *British Journal of Social Psychology*, 40(1), 133-155.
- Joireman, J., Shaffer, M. J., Balliet, D., & Strathman, A. (2012). Promotion orientation explains why future oriented people exercise and eat healthy: Evidence from the two-factor consideration of future consequences-14 scale. *Personality and Social Psychology Bulletin*, 38(10), 1272-1287.
- Jones, S., Cauffman, E., & Piquero, A. R. (2007). The influence of parental support among incarcerated adolescent offenders: The moderating effects of self-control. *Criminal Justice and Behavior*, 34(2), 229-245.

- Kelley, H. H., & Thibaut, J. W. (1978). *Interpersonal relations: A theory of interdependence*. John Wiley & Sons.
- Khachatryan, H., Joireman, J., & Casavant, K. (2013). Relating values and consideration of future and immediate consequences to consumer preference for biofuels: A three-dimensional social dilemma analysis. *Journal of Environmental Psychology, 34*, 97-108.
- Kirchler, E. (2020). Special essay contribution: "Economic Psychology and the Coronavirus Crisis". *IAREP Newsletter*, June, 7-11.
- Korn, L., Betsch, C., Böhm, R., & Meier, N. W. (2018). Social nudging: The effect of social feedback interventions on vaccine uptake. *Health Psychology, 37*(11), 1045.
- Kuiper, M. E., de Bruijn, A. L., Reinders Folmer, C., Olthuis, E., Brownlee, M., Kooistra, E. B., ... & van Rooij, B. (2020). The intelligent lockdown: Compliance with COVID-19 mitigation measures in the Netherlands. Available at SSRN 3598215.
- Kortenkamp, K. V., & Moore, C. F. (2006). Time, uncertainty, and individual differences in decisions to cooperate in resource dilemmas. *Personality and Social Psychology Bulletin, 32*, 603–615.
- National Institute for Public Health and the Environment (2020). COVID-19 (novel coronavirus). Retrieved from <https://www.rivm.nl/en/novel-coronavirus-covid-19>.
- Orbell, S., Perugini, M., & Rakow, T. (2004). Individual differences in sensitivity to health communications: Consideration of future consequences. *Health Psychology, 23*, 388-396. doi:10.1037/0278-6133.23.4.388
- Parks, C. D. (2015). *Determinants of cooperation in social dilemmas*. In D. A. Schroeder & W. G. Graziano (Eds.), *Oxford library of psychology. The Oxford handbook of prosocial behavior* (p. 524–547). Oxford University Press.
- Parks, C. D., Joireman, J., & Van Lange, P. A. (2013). Cooperation, trust, and antagonism: How public goods are promoted. *Psychological science in the public interest, 14*(3), 119-165.
- Paulhus, D. L. (1984). Two component models of socially desirable responding. *Journal of Personality and Social Psychology, 46*, 598–609
- Petrocelli, J. V. (2003). Factor validation of the consideration of future consequences scale: Evidence for a short version. *Journal of Social Psychology, 143*, 405-413. doi:10.1080/00224540309598453
- Raihani, N., & Aitken, D. (2011). Uncertainty, rationality and cooperation in the context of climate change. *Climatic Change, 108*(1-2), 47-55.
- Rappange, D. R., Brouwer, W. B. F., & Van Exel, N. J. A. (2009). Back to the consideration of the future consequences scale: Time to reconsider? *Journal of Social Psychology, 149*, 562-584. doi:10.1080/00224540903232324
- Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: weighing immediate and distant outcomes of behavior. *Journal of personality and social psychology, 66*(4), 742.

- Toepoel, V. (2010). Is consideration of future consequences a changeable construct? *Personality and Individual Differences, 48*, 951-956. doi:10.1016/j.paid.2010.02.029
- Trope, Y., & Liberman, N. (2010). Construal-Level Theory of Psychological Distance. *Psychological Review, 117*, 440-463.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124-1131.
- Webley, P., & Nyhus, E. K. (2006). Parents' influence on children's future orientation and saving. *Journal of Economic Psychology, 27*(1), 140-164.
- Weinberger, D. A., & Bartholomew, K. (1996). Social-emotional adjustment and patterns of alcohol use among young adults. *Journal of personality, 64*(2), 495-527.
- Weinberger, D. A., & Schwartz, G. E. (1990). Distress and restraint as superordinate dimensions of self-reported adjustment: A typological perspective. *Journal of personality, 58*(2), 381-417.
- Wentzel, K. R., Weinberger, D. A., Ford, M. E., & Feldman, S. S. (1990). Academic achievement in preadolescence: The role of motivational, affective, and self-regulatory processes. *Journal of Applied Developmental Psychology, 11*(2), 179-193.
- Zhao, X., Villagran, M. M., Kreps, G. L., & McHorney, C. (2012). Gain versus loss framing in adherence-promoting communication targeting patients with chronic diseases: The moderating effect of individual time perspective. *Health Communication, 27*(1), 75-85.

## Appendix A: General and precautionary measures as of the 23<sup>th</sup> of March

### General measures

(source: <https://www.government.nl/latest/news/2020/03/23/stricter-measures-to-control-coronavirus>)

- Stay home as much as possible. Leave the house only to go to work if you cannot work at home, to buy groceries or to take care of others. You can go out to get some fresh air, but do not do so in groups. Always keep a good distance from other people (at least 1.5 meters) and avoid all social activities and groups of people. At home: limit the number of visitors to 3 and keep sufficient distance (1.5m) from each other.
- As before, if you have a cough or a cold: stay home. If someone in your household develops a fever, all the members of the household should stay home. This does not apply to key workers in crucial sectors and critical processes, unless they themselves get sick.
- All gatherings are prohibited until 1 June, even gatherings of less than 100 people. This is a tightening of the existing ban (that applied up to 6 April). An exception is made for funerals and religious weddings. More information about this will follow soon.
- Public transport and shops are required to take measures to ensure that people keep a good distance. For instance, by limiting the number of people allowed in the shop at the same time.
- Businesses in contact-based industries, such as hair salons and beauty parlors, must be closed until 6 April. Other professionals, such as physiotherapists, are urged to work via video calls wherever possible.
- Casinos are now subject to the same restrictions as establishments serving food and drink, and will be closed from 24 March 2020.
- Establishments such as holiday parks must put measures in place so that people keep a distance of 1.5 meters from each other. Failing this, local authorities may order these locations to close.
- Mayors may designate areas, like parks, beaches or neighborhoods, where people are not allowed to collect together. The authorities will take action against groups of 3 or more people, who do not all maintain a distance of 1.5 meters from each other. This does not apply to children or to people in the same household, such as families.
- The ban on gatherings does not apply to public markets as these play a crucial role in bringing food to consumers in some parts of the country. Municipalities and market superintendents will examine ways that a good distance between members of the public can be maintained.

- The government also wants to be able to enforce existing measures more effectively. Mayors will have the option of enacting an emergency byelaw, to more easily and more quickly initiate enforcement activities. Mayors can also order specific locations to be closed, including parks, beaches and campsites. And people who violate the rules can be fined.

### Precautionary measures

(Source: <https://www.rivm.nl/en/novel-coronavirus-covid-19>)

- Wash your hands often with soap and water.
- Cough and sneeze into your elbow
- Use paper tissues to blow your nose and discard them after use
- Do not shake hands
- Stay 1.5 meters (2 arm lengths) away from other people.
- Work from home as much as possible.
- Stay home if you have cold symptoms.
- Stay home if someone in your household develops a fever.

## Appendix B: Descriptive statistics

Figure 6 Perceived risk assessment of becoming infected with COVID-19, and becoming ill or dying if infected

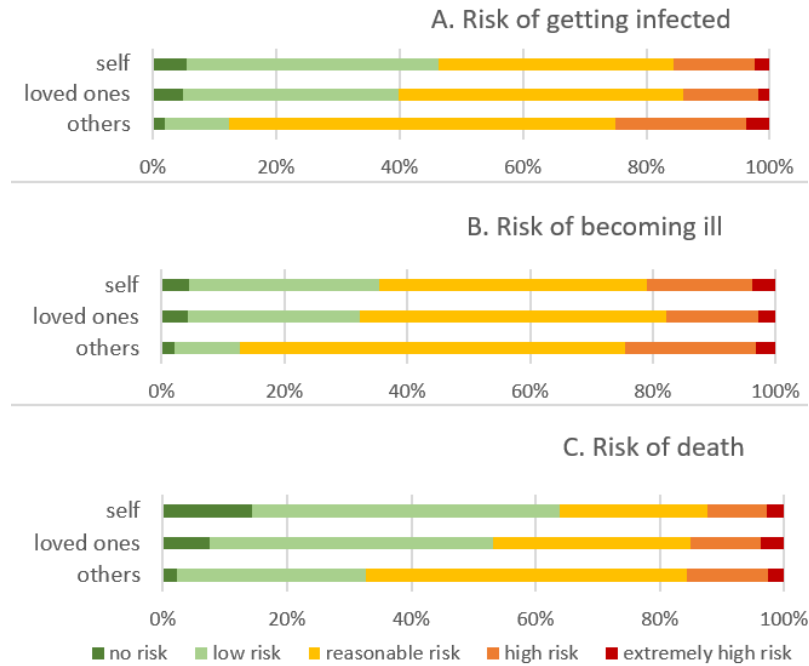


Table 4 Inter-item correlations between risk assessments

| Correlation   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |
|---|------|------|------|------|------|------|------|------|------|
| 1. Risk of becoming infected for self               | 1.00 |      |      |      |      |      |      |      |      |
| 2. Risk of becoming ill for self, if infected       | 0.60 | 1.00 |      |      |      |      |      |      |      |
| 3. Risk of dying for self, if infected              | 0.40 | 0.65 | 1.00 |      |      |      |      |      |      |
| 4. Risk of becoming infected for loved ones         | 0.61 | 0.47 | 0.30 | 1.00 |      |      |      |      |      |
| 5. Risk of becoming ill for loved ones, if infected | 0.49 | 0.54 | 0.39 | 0.73 | 1.00 |      |      |      |      |
| 6. Risk of dying for loved ones, if infected        | 0.38 | 0.46 | 0.48 | 0.56 | 0.72 | 1.00 |      |      |      |
| 7. Risk of becoming infected for others             | 0.47 | 0.41 | 0.24 | 0.52 | 0.47 | 0.33 | 1.00 |      |      |
| 8. Risk of becoming ill for others, if infected     | 0.54 | 0.48 | 0.34 | 0.44 | 0.51 | 0.39 | 0.74 | 1.00 |      |
| 9. Risk of dying for others, if infected            | 0.32 | 0.38 | 0.43 | 0.33 | 0.40 | 0.46 | 0.54 | 0.65 | 1.00 |



## Appendix C: Additional Regressions

Table 5 Regressions of standardized compliance with CFC-total instead of CFC-future

|  | Model 2a           | Model 3a           | Model 4a           | Model 5a           | Model 6a           | Model 7a           | Model 8a           |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 1. COO   |                    | 21.37***<br>(3.06) | 16.81***<br>(2.93) | 16.19***<br>(2.85) | 11.24***<br>(2.72) | 15.58***<br>(2.76) | 10.87***<br>(2.67) |
| 2. CFC   | 21.44***<br>(3.79) | 14.63***<br>(3.89) | 18.58***<br>(4.04) | 17.91***<br>(3.98) | 16.78***<br>(3.76) | 13.89***<br>(3.66) | 13.07***<br>(3.50) |
| 3. COO × CFC   |                    | -33.48<br>(25.63)  | -38.21<br>(4.04)   | -42.32*<br>(25.24) | -33.45<br>(23.46)  | -37.65<br>(23.05)  | -33.60<br>(21.62)  |
| 4. Female  |                    |                    | 4.39***<br>(0.79)  | 4.29***<br>(0.78)  | 4.15***<br>(0.73)  | 3.66***<br>(0.74)  | 3.55***<br>(0.70)  |
| 5. Age   |                    |                    | 0.18***<br>(0.03)  | 0.17***<br>(0.03)  | 0.16***<br>(0.03)  | 0.15***<br>(0.03)  | 0.14***<br>(0.03)  |
| 6. Education: base low                                 |                    |                    |                    |                    |                    |                    |                    |
| Middle   |                    |                    | 0.70<br>(1.06)     | 0.88<br>(1.06)     | 0.93<br>(0.99)     | 0.50<br>(1.01)     | 0.76<br>(0.94)     |
| High   |                    |                    | -0.61<br>(1.24)    | -0.26<br>(1.24)    | 0.13<br>(1.14)     | -0.59<br>(1.18)    | 0.12<br>(1.11)     |
| 7. Perceived risk for self                             |                    |                    |                    | 2.10<br>(0.62)     |                    |                    | -0.39<br>(0.67)    |
| 8. Poor self-assessed health (<6/10)                   |                    |                    |                    | 0.70<br>(1.22)     |                    |                    | 0.77<br>(1.18)     |
| 9. Opinion about compliance others                     |                    |                    |                    |                    | 0.25***<br>(0.03)  |                    | 0.23***<br>(0.03)  |
| 10. Perceived risk for others                          |                    |                    |                    |                    | 4.62***<br>(0.77)  |                    | 4.20***<br>(0.96)  |
| 11. Government response to pandemic: base fitting      |                    |                    |                    |                    |                    |                    |                    |
| Insufficient   |                    |                    |                    |                    |                    | 2.91***<br>(0.93)  | 2.41***<br>(0.90)  |
| Exaggerated  |                    |                    |                    |                    |                    | -9.86***<br>(1.55) | -8.63***<br>(1.37) |
| 12. Opinion about effectiveness measures: base neutral |                    |                    |                    |                    |                    |                    |                    |
| Effective  |                    |                    |                    |                    |                    | 1.19<br>(0.86)     | 1.10<br>(0.81)     |
| Ineffective  |                    |                    |                    |                    |                    | -2.93<br>(1.45)    | -1.96<br>(1.41)    |
| (Constant)   | 64.02***<br>(0.42) | 64.16***<br>(0.41) | 53.25***<br>(2.07) | 50.13***<br>*2.43) | 33.08***<br>(3.37) | 55.15***<br>(2.06) | 36.69***<br>(3.28) |
| Obs  | 860                | 860                | 860                | 860                | 860                | 860                | 860                |
| R-squared  | 0.04               | 0.10               | 0.19               | 0.21               | 0.29               | 0.28               | 0.36               |
| F  | 32.07              | 26.49              | 22.90              | 18.72              | 26.51              | 21.5               | 22.41              |
| Root MSE   | 12.26              | 11.85              | 11.29              | 11.19              | 10.55              | 10.70              | 10.11              |
| AIC  | 6753.98            | 6697.25            | 6616.17            | 6604.32            | 6503.64            | 6529.03            | 6435.29            |
| Mean VIF   | 1.00               | 1.06               | 1.28               | 1.24               | 1.24               | 1.27               | 1.36               |

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . COO and CFC are standardized and centralized to avoid multicollinearity with the interaction term. Robust standard errors between parentheses.

Table 6 Regressions of standardized compliance with CFC-immediate and CFC-future instead of only CFC-future

|                        | <b>Model 2b</b>    | <b>Model 3b</b>     | <b>Model 4b</b>     |
|------------------------|--------------------|---------------------|---------------------|
| 1. COO                 |                    | 20.73***<br>(3.12)  | 15.25***<br>(3.03)  |
| 2. CFC-future          | 15.54***<br>(3.31) | 6.68**<br>(3.27)    | 12.10***<br>(3.29)  |
| 3. COO x CFC-future    |                    | -44.89**<br>(19.38) | -39.72**<br>(18.20) |
| 4. CFC-immediate       | -7.45***<br>(2.30) | -6.93***<br>(2.44)  | -6.93***<br>(2.48)  |
| 5. COO x CFC-immediate |                    | -6.13<br>(2.43)     | -0.68<br>(16.05)    |
| 6. Female              |                    |                     | 4.50***<br>(0.79)   |
| 7. Age                 |                    |                     | 0.19***<br>(0.03)   |
| 8. Education: base low |                    |                     |                     |
| Middle                 |                    |                     | 0.78<br>(1.07)      |
| High                   |                    |                     | -0.53<br>(1.24)     |
| (Constant)             | 64.02***<br>(0.42) | 64.35***<br>(0.41)  | 53.17***<br>(2.10)  |
| Obs                    | 860                | 860                 | 860                 |
| R-squared              | 0.04               | 0.11                | 0.20                |
| F                      | 16.59              | 16.60               | 18.44               |
| Root MSE               | 12.24              | 11.83               | 11.26               |
| AIC                    | 6751.49            | 6696.41             | 6615.63             |
| Mean VIF               | 1.00               | 1.09                | 1.25                |

\* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . COO and CFC are standardized and centralized to avoid multicollinearity with the interaction term. Robust standard errors between parentheses.

Table 7 Regression of standardized compliance using the full sample

| <b>Model 8b</b>   |                    |
|---|--------------------|
| 1. COO  | 11.63***<br>(2.52) |
| 2. CFC-future   | 7.84***<br>(2.61)  |
| 3. COO × CFC-future                                       | -28.15*<br>(14.52) |
| 4. Female   | 4.27***<br>(0.68)  |
| 5. Age  | 0.14***<br>(0.03)  |
| 6. Education: base low                                    |                    |
| Middle  | 1.01<br>(0.87)     |
| High  | 0.15<br>(0.97)     |
| 7. Perceived risk for self                                | -0.38<br>(0.62)    |
| 8. Poor self-assessed health (<6/10)                      | 1.25<br>(1.05)     |
| 9. Opinion about compliance others                        | 0.22***<br>(0.03)  |
| 10. Perceived risk for others                             | 4.28***<br>(0.88)  |
| 11. Government response to pandemic:<br>base fitting      |                    |
| Insufficient  | 2.66***<br>(0.83)  |
| Exaggerated   | -9.77***<br>(1.35) |
| 12. Opinion about effectiveness<br>measures: base neutral |                    |
| Effective   | 1.22<br>(0.77)     |
| Ineffective   | -1.61<br>(1.33)    |
| (Constant)  | 38.07***<br>(3.27) |
| Obs   | 1,019              |
| R-squared   | 0.37               |
| F   | 27.81              |
| Root MSE  | 10.32              |
| AIC   | 7663.59            |
| Mean VIF  | 1.36               |

\* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . COO and CFC are standardized and centralized to avoid multicollinearity with the interaction term. Robust standard errors between parentheses.