

1 **Optimizing Decision-Making Processes in Times of COVID-19: Using** 2 **Reflexivity to Counteract Information-processing Failures**

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15 **Abstract**

16 The effectiveness of policymakers' decision-making in times of crisis depends largely on their ability
17 to integrate and make sense of information. The COVID-19 crisis confronts governments with the
18 difficult task of making decisions in the interest of public health and safety. Essentially, policymakers
19 have to react to a threat, of which the extent is unknown, and they are making decisions under time
20 constraints in the midst of immense uncertainty. The stakes are high, the issues involved are complex
21 and require the careful balancing of several interests, including (mental) health, the economy, and
22 human rights. These circumstances render policymakers' decision-making processes vulnerable to
23 errors and biases in the processing of information, thereby increasing the chances of faulty decision-
24 making processes with poor outcomes. Prior research has identified three main information-
25 processing failures that can distort group decision-making processes and can lead to negative
26 outcomes: (1) failure to search for and share information, (2) failure to elaborate on and analyze
27 information that is not in line with earlier information and (3) failure to revise and update conclusions
28 and policies in the light of new information. To date, it has not yet been explored how errors and
29 biases underlying these information-processing failures impact decision-making processes in times of
30 crisis. In this narrative review, we outline how groupthink, a narrow focus on the problem of
31 containing the virus, and escalation of commitment may pose real risks to decision-making processes
32 in handling the COVID-19 crisis and may result in widespread societal damages. Hence, it is vital
33 that policymakers take steps to maximize the quality of the decision-making process and increase the
34 chances of positive outcomes as the crisis goes forward. We propose group reflexivity—a deliberate
35 process of discussing team goals, processes, or outcomes—as an antidote to these biases and errors in
36 decision-making. Specifically, we recommend several evidence-based reflexivity tools that could
37 easily be implemented to counter these information-processing errors and improve decision-making
38 processes in uncertain times.

39 “Be open to adjustments. There's nothing about this current moment in history
40 that allows for stubbornness.”

41 ~ Unknown

42 1 Introduction

43 The COVID-19 crisis has left few, if any, countries untouched and world governments have been
44 faced with the difficult task of making decisions in the interest of public safety and health under
45 conditions of tremendous uncertainty and time pressure. Faced with constantly changing and
46 conflicting information, high stakes, time pressure, and a need to balance multiple concerns and
47 interests (e.g., physical and mental health, the economy, personal rights), governments have found
48 themselves having to make decisions on complex issues under suboptimal conditions (Otte et al.,
49 2017, 2018; Rastegary & Landy, 1993; cf. Schippers et al., 2007, 2015, 2017, 2018). Prior research
50 suggests that decision-making effectiveness in highly complex and uncertain situations, such as the
51 current crisis, largely depends on a groups’ ability to successfully acquire, integrate and make sense
52 of information (Hammond, 1996; Schippers, et al. 2014). In other words, it depends on the quality of
53 the decision-making process which is an important prerequisite that (does not guarantee but)
54 increases the likelihood of positive outcomes (Bloodgood, 2011; Nutt, 1999; Wolak, 2013).
55 Importantly, while it may not be possible to determine which decisions are best, it is possible to
56 improve the processes being used to come to those decisions, and thus increase the chances of
57 positive outcomes (Hart, 1991).

58 Prior research also suggests that distortions and failures in the decision-making process are quite
59 common (Schippers et al., 2014), especially in large decision-making groups operating under
60 suboptimal conditions. In fact, research in large companies has found that nearly 50% of decisions
61 fail, and one of the reasons for this is a flawed decision-making process (Nutt, 1999). Whereas a
62 variety of different factors may influence government level decision-making processes in times of
63 crisis (Beal, 2020; Mercer, 2020), previous research has identified a number of different biases and
64 errors that may lead to information-processing failures. Information-processing failures consist of “*a*
65 *distortion in the exchange of, communication about, or elaboration on information due to either an*
66 *omission error in information sampling or biased elaboration of the information*” (Schippers et al.,
67 2014, p. 733). For instance, in high stress situations, decision-makers have been found to rely on
68 habit and use decision-making strategies they are most familiar with (Soares et al., 2012), a problem
69 compounded by high time pressure (Ordóñez & Benson, 1997). In addition, framing effects and
70 escalation of commitment may also bias the way in which information is processed (cf. Schippers et
71 al., 2014). While these errors may readily occur at the individual level, they are often magnified in
72 larger decision-making groups, due to additional team level biases and errors (Hinsz et al., 1997),
73 such as, for instance, groupthink, where decisions are made based on a biased sampling of
74 information and the focus is on agreement at all costs (Janis, 1982; Janis & Mann, 1977).
75 Importantly, these information-processing failures have been shown to negatively impact the quality
76 of the decision-making process (Halpern et al., 2020; Hammond, 1996).

77 Clearly, while the COVID-19 crisis is ongoing, it is difficult to assess the long-term effectiveness of
78 policymakers’ decisions, not only because we currently lack the information but also because
79 governments will have to trade off different short- and long-term concerns and interests. Yet, what is
80 clear is that the circumstances surrounding the COVID-19 crisis are likely to make the decision-
81 making processes more vulnerable to information-processing failures due to the high stakes, time
82 pressure, complexity, and uncertainty involved (e.g., Joffe, 2021), thereby increasing the chances of
83 suboptimal outcomes. Indeed, emerging evidence indicates that, physical and mental health, social

84 cohesion, educational outcomes, economic development and human rights have all been negatively
85 affected during this crisis (cf. Codagnone, et al., 2020; Kissler, Tedijanto, Goldstein, et al., 2020; for
86 a review see Kissler, Tedijanto, Lipsitch, et al., 2020). Therefore, it is imperative to gain a better
87 understanding of the potential biases and errors that might lead to information-processing failures
88 and identify ways in which they can be mitigated. Hence, *our first aim* is to build upon and extend
89 previous work on group decision-making processes (cf. Schippers et al., 2014) and identify what
90 biases and errors are most likely to lead to information-processing failures in the current COVID-19
91 crisis. We use a theoretical framework derived from previous research on groups making complex
92 decisions (cf. Schippers et al., 2014) and extend it to decision-making under uncertainty. Given that
93 information about ongoing government decision-making processes is not readily available, our
94 analysis will rely on some of the published evidence on policies implemented by governments to
95 mitigate the COVID-19 crisis and the effects thereof. Note that we do not claim to be exhaustive in
96 this narrative review. *Our second aim*, is to show how team reflexivity—a deliberate process of
97 discussing team goals, processes, or outcomes—can function as an antidote to biases and errors in
98 group decision-making. From prior research, we know that information-processing failures can be
99 avoided and overcome, and researchers have previously suggested that an effective method for doing
100 so is by fostering a reflexive decision-making process in groups (Schippers et al., 2014). Specifically,
101 we will propose several simple tools that decision-making groups, such as policymakers, could use to
102 help counteract information-processing errors and increase the chances of effective decision-making
103 as the crisis unfolds.

104 We deem the contributions of this narrative review to be two-fold. First, we contribute to our
105 understanding of the biases and errors that may hamper decision-making quality and outcomes due to
106 information-processing failures in handling the COVID-19 crisis. While not all instances of
107 information-processing failures result in major consequences, during the current crisis, these remain a
108 serious and potentially deadly pitfall (Schippers, 2020). Second, given that good decision-making
109 processes enhance the chances of high-quality decisions and decision outcomes (Bloodgood, 2011;
110 Nutt, 1999; Wolak, 2013) we show how the decision-making process can be improved via
111 reflexivity. A reflexive decision-making process may prove particularly beneficial in the current
112 crisis, given that it has been shown to optimize decision-making processes in groups vulnerable to
113 information-processing failures, such as those facing complex tasks under time constraints (cf.
114 Schippers et al., 2014; 2018). Clearly, a reflexive decision-making process, will not guarantee a
115 positive outcome, yet, it increases the chances that the quality of the decisions made are better.

116 In the following sections, we will first briefly introduce our theoretical framework. Second, we will
117 identify biases that might lead to specific information-processing errors in policymakers' handling of
118 the COVID-19 crisis and present practical reflexivity tools that can be used to overcome these biases.
119 Finally, we will discuss potential policy implications, some of the limitations of our approach and
120 make some suggestions for future research.

121 **2 Information-Processing Failures During Crisis and Reflexivity as a Potential Antidote**

122 While individuals do differ in terms of decision-making competence (Bruine De Bruin et al., 2007),
123 our focus is on the group level decision-making process. In line with prior research, we conceptualize
124 groups as information-processing systems whose effectiveness relies on successfully sharing,
125 analyzing, storing, and using information (cf. De Dreu et al., 2008; Hinsz, et al. 1997; Schippers et
126 al., 2014). As information-processing systems, teams are vulnerable to information-processing
127 failures, stemming from both individual cognitive shortcomings, such as bounded rationality (e.g.,
128 Kahneman, 2003), and from breakdowns in interpersonal communication such as misunderstandings

129 or withholding of information (cf. Hinsz et al., 1997; Schippers et al. 2014). Notably, individual-level
 130 cognitive shortcomings are often magnified in larger decision-making groups, due to further
 131 information distortion created by poor communication (Hinsz et al., 1997). In this respect, prior
 132 research suggests that groups making complex decisions are vulnerable to three specific information-
 133 processing failures: (1) a failure to search for and share relevant information; (2) if information is
 134 shared, a failure to elaborate on and analyze information; and (3) a failure to revise and update
 135 conclusions in the light of new information (cf. Schippers et al., 2014, 2018; see Figure 1 for an
 136 overview of the biases and errors which fall into these categories). Importantly, these information-
 137 processing failures have been shown to hamper groups' ability to successfully acquire, integrate and
 138 make sense of information and are likely to increase the chances of a flawed decision-making process
 139 (Hammond, 1996; Schippers, et al. 2014).

140 -----
 141 INSERT FIGURE 1 HERE
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143 Prior research also suggests that information-processing failures can be avoided and overcome via
 144 reflexivity (cf., Schippers et al., 2014; 2018). Reflexivity is most often defined as: “*the extent to*
 145 *which group members overtly reflect upon, and communicate about the group’s objectives, strategies*
 146 *(e.g., decision-making) and processes (e.g., communication), and adapt them to current or*
 147 *anticipated circumstances”* (West, 2000, p. 296). Specifically, it has been proposed that team
 148 reflexivity: (1) may mitigate the failure to search for and share information by increasing the
 149 likelihood that groups will identify and use relevant and correct information (Brodbeck et al., 2007);
 150 (2) may mitigate the failure to elaborate on and draw implications from available information through
 151 explicit information-processing (cf. Lubatkin et al., 2006); and (3) may mitigate the failure to revise
 152 and update conclusions by encouraging or facilitating explicit attention to the team’s decision-
 153 making process (cf. Schippers et al., 2014; see Figure 1 for a list of potential reflexivity tools that
 154 can be used to help counteract these three information-processing failures). Crucially, reflexivity has
 155 been shown to help improve team performance (Gabelica et al., 2014; Konradt et al., 2016;
 156 Lyubovnikova et al., 2017; Otte et al., 2017; Schippers et al., 2013; Yang et al., 2020) and several
 157 review articles have examined when and why reflexivity is effective (e.g., Konradt et al., 2016; Otte
 158 et al., 2018; Schippers et al., 2014, 2018; Widmer et al., 2009).

159 In the following sections, we will use Figure 1 as a framework to (1) describe some examples of
 160 different biases and errors that may lead to information-processing failures in policymakers’ handling
 161 of the COVID-19 crisis, and (2) highlight specific reflexive decision-making strategies that could be
 162 used to optimize the decision-making process and minimize the occurrence of information-processing
 163 errors.

164 **2.1 Failure to Search for and Share Information and How Reflexivity Could Help**

165 The first kind of information-processing error which could affect decision-making during this crisis
 166 involves a failure to search for and share all relevant information. Searching for and sharing all
 167 relevant information is especially important in situations where complex decisions need to be made
 168 based on input from multiple sources (Schippers et al., 2014), such as the handling of the COVID-19
 169 crisis. Indeed, in the current situation, policy decisions are being made with input from multiple
 170 sources and fields (e.g., epidemiology, economics, behavioral sciences) in order to try and maximize
 171 the information considered (Holmes et al., 2020; Romei et al., 2020), and thereby, reach the best
 172 possible conclusions. A failure to search for and share information can stem from a variety of

173 reasons, such as a common knowledge effect, motivated information sharing or groupthink (cf.
174 Schippers et al., 2014). In the following, we will focus specifically on groupthink, a phenomenon that
175 has been identified as being most likely to occur during group decision-making under stress
176 (Sterman, 2006), such as the Bay of Pigs invasion of Cuba (Janis, 1982; Janis & Mann, 1977), or the
177 space shuttle Challenger accident (Esser & Lindoerfer, 1989). We will also propose some ways in
178 which a reflexive decision-making process may help in mitigating some of the information-
179 processing failures potentially stemming from groupthink.

180 Groupthink is a phenomenon that occurs when a group of well-intentioned people makes sub-optimal
181 decisions, usually spurred by the urge to conform or the belief that dissent is impossible (cf. Janis,
182 1982). Oftentimes, these groups develop an overly narrow framing of the problem at hand, leading to
183 tunnel vision in the search for possible solutions. Moreover, information that is not in line with or
184 contradicting the majority view is ignored or even suppressed and there is strong pressure among
185 group members to reach an agreement (Janis, 1991). For instance, prior research has shown that
186 decision-making teams tend to primarily focus on discussing commonly shared information, while
187 simultaneously minimizing discussion of unique opinions or information (Larson et al., 1996).
188 Furthermore, group members often avoid or hesitate to share information that could cause
189 disagreement and disturb the harmony within the group (Janis, 1991). According to researchers,
190 groupthink often occurs when wishful thinking and reality denial start at higher levels of the
191 organization and trickle down to become an integrated part of the decision-making process at all
192 levels (Bénabou, 2013). Furthermore, organizational structural and procedural faults have been
193 regularly related to groupthink (Tetlock et al., 1992).

194 At the beginning of the COVID-19 crisis, governments were faced with an unprecedented threat that
195 required quick action. Early estimates stated that seven billion infections and forty million deaths
196 could arise (Walker et al., 2020) with estimates of case fatality rates ranging from 0.17 % to as high a
197 20% (the latter was claimed in an article of Baud et al., 2020; for a review see Caduff, 2020).
198 Moreover, early models predicted that the spread would be exponential (Banerjee et al., 2020;
199 Ferguson et al., 2020). Based on these early estimates, many governments decided to take decisive
200 action and enforce a combination of strict lockdowns, curfews, and the closing of “non-essential
201 businesses” (cf. Choutagunta et al., 2021; Hsiang, et al., 2020) aimed at slowing down the spread of
202 the virus and preventing a collapse of critical care capacity. Some evidence seems to suggest that
203 these radical policy packages deployed to reduce the rate of transmission have significantly slowed
204 the exponential spread in certain countries such as China, Italy, France, and the United States (Hsiang
205 et al., 2020; but also see Bjørnskov, 2020). Yet, measures exclusively focused on slowing the spread
206 of the virus have also been linked with current and future economic decline (e.g., McKee & Stuckler,
207 2020) and decreased mental well-being of the general population, frontline health-care and essential
208 workers (e.g., Buckner et al., 2021; O’Connor et al., 2020; Robinson et al., 2020; Toh et al., 2021;
209 Vanhaecht et al., 2021). At the same time, the COVID-19 crisis negatively affected non-Covid
210 related public health such as the postponement or cancellation of medical treatments (Heath, 2020;
211 Schippers, 2020). Also, the policies have exacerbated existing human rights violations in many
212 countries, and enabled others (Fisman et al., 2020; Saunders, 2020). Thus, it appears that an initial
213 focus on slowing the spread of the virus may have led to a narrow problem framing, which may have
214 resulted in either discounting information about, or minimizing the possible extent of negative
215 consequences in other domains, such as the economy, well-being, non-Covid related public health, or
216 human rights. Some researchers have, for instance, suggested that little attention has been paid to the
217 potential side effects of the preventative measures taken, and questioned the extent to which some
218 countries’ policies are evidence-based and proportional (Ioannidis et al., 2020; Ioannidis, 2020; Joffe,
219 2021; Schippers, 2020). A narrative review of Joffe (2021; p. 1) concluded that the cost-benefit

220 analysis of the COVID-19 response was very negative and that “lockdowns are far more harmful to
221 public health than COVID-19 can be”

222 Relatedly, given that most governmental policies have been grounded in the precautionary principle
223 (Sunstein, 2019) of avoiding deaths and minimizing the spread of the virus, the communication of
224 these policies has tended to rely on war analogies and fear-based references to the magnitude of the
225 threat to justify a “one size fits all” approach (Caduff, 2020). In the process, it appears that dissenting
226 voices may have been drowned out in various countries ranging from Western liberal democracies to
227 more autocratic states (cf. Abazi, 2020; Niemiec, 2020; Sherman, 2020; Timotijevic, 2020). For
228 instance, the mainstream public discourse has largely ignored early voices suggesting that lockdowns
229 might significantly disrupt supply chains, lead to massive unemployment, and to exacerbating
230 poverty in developing countries leading to food insecurity for more than 100 million people (Inman,
231 2020; Zetzsche & Consiglio, 2020). Also, in some countries, those questioning the measures were
232 silenced, marginalized or labelled as traitors in the mainstream media (Abazi, 2020; Joffe, 2021).
233 Although very worrisome, this is in line with previous work suggesting that silencing dissenting
234 opinions is a historically common government response to pandemic situations, aimed at steering the
235 public narrative and bolstering support for government actions (Timotijevic, 2020). In addition, given
236 the proliferation of fake news and misinformation, many technology platforms have been forced to
237 rush in and remove potentially dangerous false information (Abrusci, 2020). Yet the censorship of
238 social media as a remedy to the spread of medical disinformation has been called into question (cf.
239 Niemiec, 2020) and some evidence suggests that simple nudging interventions might also work in
240 fighting misinformation, without the need for pervasive social media censorship (cf. Pennycook et
241 al., 2020). Whereas presenting a strong, united front in the face of possible panic is important, it is
242 equally important to allow for dissenting and conflicting opinions to be brought forward. This is all
243 the more important in situations such as the current crisis, where potentially relevant information is
244 spread across multiple disciplines and the state of knowledge is constantly evolving and changing. In
245 this respect, some authors have highlighted a lack of access and transparency regarding the data used
246 by policymakers, poor data input and a reluctance to admit uncertainties in the data (Heneghan &
247 Jefferson, 2020; Ioannidis et al., 2020; Jefferson & Heneghan, 2020), selective reporting of forecasts,
248 and a lack of transparency in the modeling and assumptions used to inform public policy (Ioannidis
249 et al., 2020). These may all have impeded building an accurate understanding of the situation based
250 on shared facts and open public discourse among different groups of scientists and policymakers.

251 Importantly, ignoring or silencing dissenting and conflicting opinions is likely to induce groupthink
252 and lead to a narrow focus in the decision-making process during crisis. This, in turn, has been shown
253 to lead to decisions based on incomplete or one-sided information, which negatively affect the
254 chances of achieving positive outcomes (Hart, 1991). In this case, the failure to search for and share
255 as much relevant information as possible may also have been compounded by a general human
256 tendency to underprepare for disasters (Meyer & Kunreuther, 2017; Murata, 2017), and the fact that
257 warnings from the scientific community to plan for a potential deadly viral outbreak before the
258 COVID-19 crisis were repeatedly ignored (Horton, 2020). Thus, without a clear response plan, as the
259 crisis emerged, many governments were under pressure to rapidly make sense of incoming
260 information, reach quick decisions, and take decisive action. This pressure may have been amplified
261 by a fear of being blamed for doing “too little” (Bylund & Packard, 2021) and by the intense media
262 focus on the issue. Consequently, initially exaggerated pandemic estimates, case fatality rates,
263 projected rates of community spread, and a focus on only a few dimensions or outcomes at the
264 expense of the larger picture (cf., Ioannidis, 2020; Ioannidis et al., 2020), may have led to some
265 wrong assumptions underlying initial pandemic-response policies. Furthermore, these assumptions
266 may not have subsequently been questioned or updated based on newly emerging information.

267 In sum, while the COVID-19 situation is still unfolding, it is difficult to ascertain whether groupthink
268 is indeed featuring in individual government's decision-making processes, yet, based on our analysis,
269 it is possible that at least some of its characteristics might occur (see also Timotijevic, 2020; see
270 Joffe 2021 for examples of groupthink). Clearly, at this point in time, neither the evolution of the
271 disease itself nor the long-term economic, societal, mental health or human rights impact of the crisis
272 can be known. Although some researchers have attempted to predict how events will unfold
273 (McKibbin & Fernando, 2020), it is still too early to understand what the long-term effects will be.
274 That being said, there seems to be some evidence suggesting that a long-term public policy
275 exclusively focused on slowing the spread of the virus does have negative side-effects in society at
276 large, some of which may have been avoidable via a more holistic approach integrating multiple
277 perspectives and points of view. A holistic approach integrating information from multiple sources,
278 perspectives and points of view has been shown to be critical in ensuring a better quality of the
279 decision-making process (cf., Schippers et al., 2014).

280 In this respect, we propose reflexivity as a method of counteracting reliance on incomplete
281 information, as it explicitly encourages the pooling and consideration of information scattered across
282 multiple group members (Schulz-Hardt et al., 2006). Reflexivity encourages making the decision-
283 making process an explicit balance of advocacy and inquiry, with a focus on widening the array of
284 opinions considered, rather than on decision-making harmony within the group (for an overview of
285 some practical tips for fostering reflexivity, see Figure 1). For instance, one practical tool that may
286 offer a simple solution to counter groupthink is the use of a simple checklist (see Table 1). This
287 checklist is based on the early work on groupthink by Janis (1991) and forms a useful basis as a
288 quick screen for symptoms of groupthink to be aware of, check for, and avoid. Furthermore, previous
289 research suggests that actively encouraging the discussion of unique, or dissenting opinions is also
290 important, as it allows for a broader framing of the problem at hand and protects against the pitfall of
291 groupthink (cf. Emmerling & Rooders, 2020). In order to facilitate the open sharing of information,
292 previous research suggests that creating psychological safety within the group (cf. Edmondson, 1999)
293 and appointing a strategic dissenter are critical (Emmerling & Rooders, 2020). Moreover,
294 transformational leadership (Schippers et al., 2008) and avoiding an overreliance on experts (Gino &
295 Staats, 2015) have also been shown to facilitate reflexive decision-making processes likely to
296 incorporate a broader array of information, interests and perspectives.

297 **2.2 Failure to Elaborate on and Analyze Information and How Reflexivity Could Help**

298 Even if (reliable and high-quality) information has been gathered, information-processing failures
299 can occur during the process of analyzing and elaborating on that information. Prior research
300 suggests that information elaboration is especially critical in highly turbulent times (Resick, et al.,
301 2014) and when groups are faced with a complex task (cf. Schippers et al., 2014; Vashdi et al., 2013),
302 such as the current COVID-19 crisis. Failures to elaborate on and analyze the implications of
303 available information can stem from a variety of reasons, the most important ones being framing
304 effects (i.e., the tendency to make different decisions based on how the problem is presented;
305 Tversky & Kahneman, 1981), reliance on heuristics (i.e., simple rules of thumb guiding decisions;
306 Kahneman, 2003), and positive illusions, such as for instance, illusions of control (cf. Schippers et
307 al., 2014; Figure 1). In the following, we will focus specifically on how framing effects may lead to
308 errors in analyzing and elaborating on the available information in handling the COVID-19 crisis,
309 and we will propose some ways in which a reflexive decision-making process may help in mitigating
310 these errors.

311 Framing effects occur when presenting information in different ways changes, and even reverses,
312 how people make decisions about equivalent choice problems (e.g., Kahneman, 2003). Prior research
313 suggests that framing influences both problem definition and causal analysis (cf. Entman, 2007). As
314 such, framing effects have been shown to be critical to our understanding of how people make
315 decisions, especially decisions involving risk (for recent meta-analyses see Kühberger, 1998; Steiger
316 & Kühberger, 2018). In addition, recent research suggests that time pressure amplifies framing
317 effects (Diederich et al., 2018), especially in group-decision-making settings, due to group
318 polarization (i.e., groups show a pronounced tendency to shift to more extreme positions than those
319 originally held by any of the individual members; Cheng & Chiou, 2008). The first demonstration of
320 the framing effect stems from an experiment by Tversky and Kahneman (1981), who used an
321 experimental paradigm, the ‘Asian Disease Problem’, to test how the framing of a problem in terms
322 of potential gains and losses affected decisions about possible solutions. In this experiment,
323 participants are given a scenario in which they are warned about the outbreak of a dangerous disease,
324 expected to kill 600 people. Then they are presented with a choice between two equivalent solutions
325 (one involving a certain outcome and the other involving a risky outcome), which are framed either
326 as a gain (lives saved) or as a loss (lives lost). When participants were presented with solutions
327 framed as a gain (number of lives saved), they tended to choose the solution with a certain outcome.
328 However, when they were presented with solutions framed as a loss (number of lives lost), they
329 tended to choose the solution with a risky outcome. This study which has been replicated in various
330 contexts (cf. Steiger & Kühberger, 2018 for a recent meta-analysis), including during the COVID-19
331 pandemic (Hameleers, 2020), suggests that framing a decision in terms of numbers of lives lost (vs.
332 saved) tends to lead to decisions involving higher risks.

333 These findings might be highly relevant during the COVID-19 crisis, which has been characterized
334 by extensive social and popular media coverage, overwhelmingly focusing on the daily infection
335 rates, hospital occupancy rates, and virus-related death toll (cf. Ogbodo et al., 2020; Schippers,
336 2020). This incessant media focus on tracking daily infections and lives lost and framing the
337 discourse as a choice between public health and the economy (cf. Codganone et al., 2020; Huseynov
338 et al., 2020), has also contributed to shaping public opinion and the spreading of fear (Ogbodo et al.,
339 2020). In addition, it may even have influenced various policy choices, which would be in line with
340 past research showing that media coverage of health emergencies (e.g., epidemics, pandemics) has
341 been crucial in the framing of public policy debates and policy responses (Dry & Leach, 2010;
342 Karnes, 2008; Pieri, 2019). Thus, given the overwhelming public focus on the daily reports of new
343 infections and deaths, policymakers might have felt pressured to make quick decisions based on these
344 rapid number fluctuations. Relatedly, the problem has tended to be framed narrowly as one of
345 avoiding deaths caused by the new coronavirus, as opposed to being framed more broadly as one of
346 public health, or even more broadly as one of societal well-being — with all that it entails, including
347 a healthy economy, public physical and mental health, social justice, etc. This narrow problem
348 framing, in turn, may have influenced information elaboration and analysis of the situation and,
349 paradoxically, may have led to riskier policy decisions (cf. Ioannidis, 2020) than a broader problem
350 framing would have.

351 For instance, a focus on preventing COVID-19 related deaths has led to a number of policies centered
352 around containment, which have included the controversial closing of borders and shutting down of
353 entire societies for weeks or even months (for some criticisms regarding the evidence-base of such
354 decisions see Ioannidis, 2020; Ioannidis et al., 2020). Whereas these policies may have indeed
355 reduced individuals’ risk of infection, they also exposed them to other risks, such as losing their
356 sources of livelihood (e.g., Codagnone et al. 2020), depression, burnout, and anxiety (e.g., Amerio et
357 al., 2020; Buckner et al., 2021; Fiorillo et al., 2020; O’Connor et al., 2020; Robinson et al., 2020). It

358 also appears that vulnerable populations such as those already suffering from mental health issues or
359 addictions, and women and children living in abusive households may have been particularly
360 negatively affected (e.g., Acenowr & Coles, 2021; Buttell, et al., 2020; Clarke et al., 2020; Graham-
361 Harrison, et al., 2020; Pfefferbaum & North, 2020; Reger et al., 2020; Rumas et al., 2021; Sakamoto
362 et al., 2021; Schippers, 2020; Serafini et al., 2016; Zetsche & Consiglio, 2020). It is undeniably
363 crucial that policymakers should focus on protecting public health by preventing coronavirus-induced
364 deaths. Yet public health can also be threatened by reduced mental well-being, the discontinuation of
365 regular care and food insecurity. Moreover, societal well-being depends on functioning economies,
366 the rule of law and social justice (cf. Drucker, 2003). Therefore, the main criticisms that have been
367 brought forward have centered around the use of interventions without full consideration of the
368 evidence pointing to their impact on society at large (Haushofer & Metcalf, 2020). A broader
369 problem framing in terms of societal well-being might have avoided some of these negative effects,
370 since it would have led to the consideration and balancing of a larger array of factors and interests in
371 the decision-making process. For instance, by simultaneously taking into account effects on public,
372 economic, and mental health, as well as on those most vulnerable in society, more evidence-based
373 policies could have been implemented that would also have minimized risks in these domains.

374 The framing of the speed of spread of the virus in terms of daily exponential growth rates in the
375 popular media is also likely to have shaped public opinion and policymakers' decision-making
376 processes. For instance, a pervasive bias that is highly vulnerable to framing effects is exponential
377 growth prediction bias, the phenomenon whereby people underestimate exponential growth when
378 presented with numerical information (Wagenaar & Sagaria, 1975; Wagenaar & Timmers, 1979). In
379 the context of COVID-19, this bias has been shown to lead to a systematic tendency to underestimate
380 the number of COVID-19 cases or fatality rates in the future based on current numbers (Banerjee et
381 al., 2021; Wagenaar & Sagaria, 1975). This bias, may also have contributed to more risky decision-
382 making, by potentially leading to unwarranted lax policy-measures (e.g., when current infection rates
383 were low but likely to grow exponentially) or to the late introduction of stricter policy-measures (e.g.,
384 when current infection rates were already too high). In this respect, previous research has shown that
385 a different framing and communication of exponential growth functions in terms of doubling times
386 rather than in terms of case growth and daily exponential growth rates tends to decrease exponential
387 growth prediction bias (cf. Schonger & Sele, 2020) and can improve the quality of the decision-
388 making process by leading to a more accurate analysis of the data at hand.

389 In sum, it appears that various framing effects in the public discourse may have negatively impacted
390 policymakers' information elaboration and analysis of the potential implications of policies. Clearly
391 other information-processing failures in the elaboration of information may stem from a variety of
392 other individual-level cognitive biases, such as the availability bias or the salience bias (Kahneman,
393 2003; for a discussion of other specific decision-making biases that may have played a role in the
394 handling of the COVID-19 crisis see Halpern et al., 2020) and we do not claim to be exhaustive here.
395 Our analysis does, however, indicate that, given the complexity and uncertainty of the situation, there
396 is a need to focus on a decision-making process grounded in data and, whenever possible, prior
397 evidence. Of course, as the situation continues to unfold information and data at any point in time is
398 limited and constantly being updated. Yet, a decision-making process that frames the problem to be
399 solved more broadly and explicitly considers and weights possible consequences for a variety of
400 societal stakeholders is critical in avoiding unnecessary risks to the health, well-being, and
401 livelihoods of individuals.

402 In this respect, reflexive decision-making might help in mitigating the failure to elaborate on and
403 analyze the implications of one's decision-making (cf. Schippers et al., 2014). A reflexive decision-

404 making process can help in terms of facilitating data-driven decisions and highlighting the need to
 405 create disconfirmable statements (i.e., phrased in such a way that they are falsifiable). This would
 406 facilitate deliberate reflection by allowing for discussions that balance advocacy and inquiry, a
 407 careful weighting of the information available, and the consideration of different stakeholders'
 408 perspectives (see Figure 1), thereby aiding a group in creating a realistic picture of the situation. For
 409 instance, one possible way to facilitate deliberation and a decision-making process grounded in data
 410 would be to apply strategies aimed at minimizing framing effects. Some evidence-based strategies
 411 that could easily be applied by policymakers are, for example, multitasking and considering multiple
 412 frames simultaneously (e.g., saving lives *and* saving the economy vs. saving lives *or* saving the
 413 economy); broadening the frame (e.g., focusing on societal well-being rather than on solely avoiding
 414 COVID-19 related deaths); increasing the number of options or solutions considered simultaneously;
 415 shifting one's reference point (e.g., shifting from a prevention focus which aims at avoiding negative
 416 outcomes to a promotion focus which aims at approaching positive outcomes); and considering the
 417 opportunity costs of any particular decision (cf. Ariely, 2008; Heath & Heath, 2013). Another
 418 potentially useful technique that has been shown to facilitate deliberation, information sharing, and a
 419 weighting of relevant information in the decision-making process is brainwriting (e.g., Heslin, 2009;
 420 Paulus & Yang, 2000). In contrast to engaging in a group-brainstorming session (which typically
 421 happens in decision-making groups and has repeatedly been shown to lead to lower quality ideas; cf.
 422 Paulus & Brown, 2007), brainwriting implies that the different group members individually write
 423 down and share their ideas by passing notes to each other, prior to engaging in a group discussion.
 424 This process has been shown to be more effective than a traditional group-brainstorming technique in
 425 terms of yielding higher quality ideas, given that it allows for explicit attention to the exchanged
 426 ideas as well as providing the opportunity for group members to reflect on the exchanged ideas after
 427 they have been generated (cf. Paulus & Yang, 2000).

428 **2.3 Failure to Revise and Update Conclusions and How Reflexivity Could Help**

429 Even if decision-making groups succeed in successfully elaborating on and analyzing the information
 430 available to them, effective information-processing may be compromised by a failure to revise and
 431 update conclusions. Prior research suggests that this is a particular challenge for groups making
 432 decisions in high-stakes, continuously evolving complex situations (cf. Schippers et al., 2014) such
 433 as the current COVID-19 crisis. Failures to revise and update conclusions can stem from a number of
 434 reasons (see Figure 1) such as social entrainment (i.e., the failure to update conclusions that are taken
 435 for granted due to entrenched patterns; Schippers et al., 2014), escalation of commitment (i.e.,
 436 persisting on a course of action, even though changing to a new course of action would be
 437 advantageous; Sleesman, et al., 2018), and confirmation bias (i.e., actively seeking out evidence that
 438 confirms one's beliefs and expectations, while ignoring or failing to seek out evidence that might
 439 disconfirm one's beliefs; Nickerson, 1998). Below we will discuss how escalation of commitment
 440 and confirmation bias may lead to information-processing failures in revising and updating
 441 conclusions in handling the COVID-19 crisis and propose some ways in which reflexivity could help
 442 in mitigating some of these failures.

443 As the COVID-19 crisis is still evolving, it is key that decision-making groups remain flexible, and
 444 are able to evaluate and change their course of action if it turns out to be necessary (Whitworth,
 445 2020). Indeed, prior studies have shown that in order to function effectively, it is crucial that
 446 decision-making groups are able to adapt to new information and circumstances (LePine, 2005).
 447 However, this is more problematic than it seems, partly because the difficulty of their goal is often
 448 inversely related with their likelihood of successfully adapting to changing circumstances (LePine,
 449 2005). A common bias impeding flexibility is escalation of commitment, where people keep

450 investing more resources in a set course of action, even in the face of clear evidence that it is not
451 working, or that better options are available (Arkes & Blumer, 1985; Dijkstra & Hong, 2019; for a
452 review see Sleesman et al., 2018). A recent review suggests that an explanation for this phenomenon
453 in groups lies in the need to publicly stand by and justify prior decisions, and that this tendency is
454 magnified in diverse groups (Sleesman et al., 2018). For instance, in the context of COVID-19, it
455 seems that early predictions on infection fatality rates (e.g., Ferguson et al., 2020), that are now
456 known to be far too high, have hardly led to an update in policies for most countries (but see Bylund
457 & Parker, 2021 for an account of how Swedish policymakers revised and updated their policies). The
458 actual inferred infection fatality rates seem to be much lower than early estimates, even for countries
459 that had light or no lockdowns (Bylund & Packard, 2021; Ioannidis et al., 2020; Jefferson &
460 Heneghan, 2020). As a case in point, while the early prediction for California was that at least 1.2
461 million people over the age of 18 would need a hospital bed, and that 50,000 additional hospital beds
462 were needed, at the height of the infection well under five percent of hospital beds were occupied by
463 COVID-19 patients (Ioannidis et al., 2020). In the end, very few hospitals were overwhelmed, and if
464 they were, this was only for a short period of time. In addition, it seems that early modeling for the
465 resurgence of the virus (second and third waves) was also inaccurate (Ioannidis et al., 2020; but see
466 Andrew, 2020 for a critique), and it has even been argued that the repeated lockdowns were too late
467 or too loose to be effective (Chaudhry et al., 2020). The most recent study noted that the “available
468 evidence suggests average global IFR of ~0.15% and ~1.5-2.0 billion infections by February 2021
469 with substantial differences in IFR and in infection spread across continents, countries and locations”
470 (Ioannidis, 2021, p. 1, IFR = Infection Fatality Rate). Despite these evolving insights suggesting for
471 instance that early intervention might be important (Chernozhukov et al., 2021; Dergiades et al.,
472 2020), it appears that few countries critically assessed the effectiveness and timing of specific
473 policies and changed course of action accordingly.

474 This potential escalation of commitment might be due to the fact that the crisis is unfolding ‘live’
475 under tremendous amounts of public and media scrutiny. Thus, policymakers might feel pressured to
476 be seen as competently and decisively handling the crisis, which might lead them to stick to and
477 justify prior decisions (cf. Sleesman et al., 2018). For instance, prior research suggests that, in crisis
478 situations, followers expect leaders to provide clarity of direction and make things happen (cf. Boin,
479 et al., 2013; Sutton, 2009). The media reporting of the COVID-19 crisis focusing on daily
480 fluctuations in infection rates, hospital bed occupancy and fatality rates, magnifies fear and anxiety
481 among the general public, and thus puts pressure on policymakers to provide clarity of direction by
482 sticking to a chosen course of action. In addition, public framing of the situation as a “war against an
483 invisible enemy” (Wicke & Bolognesi, 2020) and the highly moralized public discourse dividing
484 people into “patriots” and people to blame (Caduff, 2020), may also contribute to an action-oriented
485 focus on “defeating this enemy” and an overestimation of the extent to which the situation can be
486 controlled. This combination of public scrutiny, perceived need to provide clarity of direction and an
487 action-orientation, leave little room for revising and updating conclusions and changing strategy.

488 Relatedly, confirmation bias may also have contributed to escalation of commitment and a failure to
489 update and revise information and conclusions during the COVID-19 crisis. A tendency to focus on
490 information in line with one’s initial ideas at the expense of disconfirming information, could lead to
491 overreliance on interventions that are not evidence-based (cf. Ioannidis, 2020), and to the suppression
492 of dissenting voices (cf. Abazi, 2020). This, in turn, could lower the chances of learning new
493 information and updating conclusions. Given the uncertain nature of the situation, it is to be expected
494 that decisions made at any given point in time may no longer be the best decisions as the situation
495 continues to change and evolve (Tolcott et al., 1989). For instance, the most commonly implemented
496 policy-measures are predicated on social distancing, based on the initial assumption that the primary

497 virus transmission vector is via large droplets. However, more recent evidence seems to suggest that
498 airborne transmission (i.e., via smaller droplets) plays a significant, yet previously underestimated,
499 role in the spread of the virus (cf. Bazant & Bush, 2021; Buonanno et al., 2020). These new insights
500 render policies based primarily on social distancing measures insufficient to curb the spread of the
501 virus and would require policy revisions. Other researchers have asked for more nuanced
502 recommendations on the use of masks by the general public given that they have potential physical
503 and psychological side-effects (for a meta-analysis see Kisielinski et al., 2021), while others have
504 argued for “multi-prolonged population-level strategies” (Alwan et al., 2020). Yet other researchers
505 have called for alternative approaches which conceptualize public health in broader terms than simple
506 infection control (Lenzer, 2020). For example, three eminent epidemiologists and public health
507 experts from Harvard, Oxford and Stanford published the Great Barrington Declaration, which has
508 been signed by hundreds of thousands of concerned citizens, and tens of thousands of medical
509 practitioners and scientists arguing for a focused protection approach to handling the crisis. This
510 proposed approach aims to balance the need to protect high-risk individuals from COVID-19 while
511 reducing the “collateral harms” and serious consequences ensuing from prolonged lockdowns
512 (Lenzer, 2020).

513 A failure to incorporate new evidence and insights into policymakers’ decision-making process can
514 have damaging consequences not only in terms of effectively handling the public health crisis, but
515 also in terms of potential long-term side-effects such as weakened economies, compromised
516 democracies, and even a legitimization of the use of force (Caduff, 2020; Schippers, 2020; Wicke &
517 Bolognesi, 2020; Zetzsche & Consiglio, 2020). We propose that reflexivity can help mitigate the
518 failure to revise and update conclusions by facilitating explicit attention to the decision-making
519 process (see Figure 1). We also deem it to be crucial in promoting evidence-based solutions that
520 incorporate newly emerging scientific insights regarding the spread of the virus, potential mitigation
521 or treatment options, and the effects of current policies. As such, reflexive decision-making is an
522 ongoing process: groups constantly reassess the situation, collect and weigh newly arising evidence,
523 are willing and able to reflect on the actions they have taken, and, when necessary, are prepared to
524 change the current direction or make adjustments to it (cf. Schippers et al., 2014). For instance, an
525 effective intervention that can promote reflexivity and help avoid escalation of commitment, is a
526 simple reminder to “stop and think” (cf. Okhuzyen, 2001; Schippers et al., 2014). This simple
527 instruction serves as an interruption and provides some much-needed distance from action. In
528 addition, holding groups accountable for the decision-making process (i.e., having to account for the
529 manner in which decisions are reached) as opposed to holding them accountable for the outcomes of
530 decisions, has been shown to facilitate more careful information-processing (cf. Lerner & Tetlock,
531 1999), reduce the chances of escalation of commitment (Schippers et al., 2014), and induce more
532 complex decision-making strategies (Tetlock & Kim, 1987). A focus on process accountability as
533 opposed to outcome accountability might be especially relevant during the COVID-19 crisis, given
534 that the situation is highly uncertain and requires the careful consideration of multiple perspectives as
535 well as a continuous reassessment of potential courses of action. Finally, some effective strategies
536 that could help beat the confirmation bias trap are: seeking out information from a broad range of
537 sources; actively seeking out disconfirming information; entertaining or testing multiple hypotheses
538 simultaneously; sparking constructive disagreement; assigning one team member the role of devil’s
539 advocate; or testing assumptions in small pilots prior to full solution rollout (e.g., Ariely, 2008;
540 Bazerman & Moore, 2008; Heath & Heath, 2013). In sum, as new information becomes available,
541 and more widespread knowledge of the effects of the crisis become visible, it is crucial that
542 policymakers try to avoid information-processing failures by engaging in an ongoing process of
543 reassessing the situation, incorporating newly arising evidence, and being willing to change course of
544 action based on the evidence.

545 3 Discussion

546 The Covid-19 crisis currently sweeping the globe has brought about numerous unforeseen difficulties
547 and problems. Policymakers are making high stakes decisions about how to respond on the basis of
548 constantly evolving and incomplete information, under time constraints, and in the face of immense
549 uncertainty and public pressure. These suboptimal circumstances render decision-making processes
550 vulnerable to errors and biases in the processing of information, thereby increasing the chances of
551 faulty decision-making processes with poor outcomes. In the current situation, errors and biases in
552 decision-making have the potential to result in widespread societal damages (Caduff, 2020; Joffe,
553 2021; Schippers, 2020), and it is vital that policymakers take steps to maximize the quality of the
554 decision-making process (Halpern et al., 2020) and increase the chances of positive outcomes as the
555 crisis goes forward.

556 Prior research on the effects of information-processing failures has suggested that these can be
557 mitigated through reflexivity, however it has not yet been explored how reflexivity can contribute to
558 optimizing decision-making processes during times of crisis. Thus, we applied and extended the
559 theoretical framework of Schippers et al. (2014) on information-processing failures in groups, (1) to
560 further our understanding of the biases and errors that may hamper decision-making quality in
561 handling the COVID-19 crisis and (2) to outline how reflexivity can help in mitigating these potential
562 errors. In our analysis, we classified potential errors and biases as falling into one of three categories
563 of information-processing failures: (1) a failure to search for and share relevant information; (2) if
564 information is shared, a failure to elaborate on and analyze information; and (3) a failure to revise
565 and update conclusions in the light of new information (cf. Schippers et al., 2014, 2018).
566 Specifically, we identified groupthink, framing effects, and escalation of commitment as posing the
567 largest risks to decision-making processes in handling the COVID-19 crisis and have provided
568 practical reflexivity tools that can be used to overcome these biases.

569 3.1 Implications for Policymaking

570 Groupthink, a narrow focus on the problem of containing the virus, and escalation of commitment
571 pose real risks to decision-making processes in handling the COVID-19 crisis and may result in
572 devastating consequences for lives and livelihoods for decades to come (Caduff, 2020; Joffe, 2021;
573 Schippers, 2020). With the crisis already in full swing, information-processing failures may have
574 already had an impact on decisions made (Halpern et al., 2020). Therefore, it is critical that future
575 decisions are based on sound decision-making processes. To this end, we have proposed that
576 reflexivity, may offer the key to helping policymaking groups improve their decision-making
577 process. Implementing a reflexive decision-making process could help policymakers going forward
578 by minimizing the occurrence of information-processing errors and by enabling them to maximize
579 the chances of good outcomes in the future. We have recommended several evidence-based
580 reflexivity tools that could easily be used to counter these specific information-processing errors (see
581 Figure 1). For instance, using a checklist to assess symptoms of groupthink; appointing a strategic
582 dissenter; creating psychological safety for speaking up; and avoiding overreliance on experts (cf.
583 Emmerling & Rooders, 2020; Gino & Staats, 2015), could all help avoid the pitfall of groupthink. In
584 addition, we have proposed reflexivity tools that would facilitate a broader framing of the current
585 problem and help groups take data-driven decisions, based on a careful weighting of information and
586 the consideration of potential consequences across different domains for various stakeholders. For
587 example, brainwriting; multitasking and considering multiple frames simultaneously; increasing the
588 number of options or solutions considered simultaneously; and considering the opportunity costs of
589 any particular decision, could all help in minimizing framing effects (cf. Heath & Heath, 2013;

590 Schippers et al., 2014) and result in more holistic policy approaches. Finally, The simple yet effective
591 reflexivity tools we have put forward may help focus policymakers' explicit attention to the decision-
592 making process and help them avoid escalation of commitment, such as a simple reminder to "stop
593 and think" (cf. Okhuyzen, 2001) and process accountability.

594 The current pandemic has certainly been unprecedented and disruptive on all fronts. Yet, the future is
595 likely to harbor many more unpredictable, unprecedented, highly disruptive, global events which will
596 require quick action based on a sound decision-making process. To increase the chances of handling
597 such future crises successfully, it is critical that policymaking groups lay the foundations for sound
598 decision-making processes in the future by building internal capabilities in sensing, shaping, and
599 flexibly adapting to circumstances as they happen. In other words, it is crucial that they build overall
600 group reflexivity and reflexive decision-making capabilities. Prior research has developed several
601 tools and interventions to help increase overall team reflexivity, which might be relevant in this
602 respect (cf. Otte et al., 2017; Schippers et al., 2007). For instance, institutionalizing guided reflexivity
603 processes (i.e., debriefing or post-mortem analyses), analyzing one's own and other groups' failures
604 has been shown to help groups improve decision-making processes and outcomes (cf. Ellis et al.,
605 2014; Schippers et al., 2014). Therefore, it is imperative that policymakers critically evaluate the
606 outcomes of their and their peers' decisions in handling the current crisis and draw learnings for the
607 future. Evidently, in the case of unprecedented events it is impossible to reflect on and analyze past
608 successes and failures, yet it is possible to prepare for plausible even if seemingly unlikely future
609 events. Hence, to build capability in managing uncertainty it is also important to institutionalize
610 reflexive group processes aimed at foresight, by using tools such as 'premortems' (i.e., identifying
611 the causes of hypothetical future failures), contingency planning (i.e., creating a playbook for
612 emergency cases), or scenario planning (i.e., using stories about possible alternative futures to
613 challenge and reframe assumptions about the present; cf. Scoblic, 2020). Although such preparedness
614 seems to have been available in the form of "event 201", an exercise organized by the Johns Hopkins
615 Center for Health Security in partnership with the World Economic Forum and the Bill and Melinda
616 Gates Foundation. It was a high-level pandemic exercise, modeling a fictional Corona pandemic, and
617 was aimed at diminishing societal and economic consequences². When the crisis occurred, these aims
618 seem not to have been reached, despite the uncanny resemblance of the event and the subsequent
619 crisis. Using a scientific approach to handling these crises, this would allow for better upfront
620 preparedness in handling future crises and facilitate an ongoing reflexive decision-making process.

621 **3.2 Implications for Research**

622 Our analysis provides an important starting point in identifying potential biases and errors that may
623 hamper the decision-making process during the COVID-19 crisis, yet it also suffers from some
624 important limitations that warrant further investigation. First, given that the situation is currently
625 unfolding, there is little available evidence regarding the decision-making processes that
626 policymakers have implemented, as the process is often not transparent. Therefore, we relied on the
627 limited published evidence on decisions made and their outcomes. Yet, it is very difficult to infer
628 how decisions were made on the basis of their outcomes. Therefore, as more information becomes
629 available, future research would benefit from examining what decision-making processes were used
630 by various policymaking groups during this crisis, which processes resulted in the best outcomes, and
631 how these processes can be implemented for use in future crisis decision-making. Second, to date, we
632 do not have a clear understanding of the extent to which policymakers across different countries have
633 involved the general public in the decision-making process. Based on the currently available data it
634 appears that open public debate was shunned in numerous countries (cf. Abazi, 2020; Sherman,
635 2020; Timotijevic, 2020), yet it is possible that this was not the case in others. Prior research suggests

636 ¹that, when it comes to complex policy decisions, people care about having voice (i.e., have the
 637 opportunity to express their opinions in the decision-making process, even if not personally involved
 638 in the process). Importantly, voice has been shown to lead to increased trust in government and
 639 policy acceptance (cf. Terwel et al., 2010). Thus, investigating the extent to which the general public
 640 was given voice in the decision-making process surrounding COVID1-19 and how this may have
 641 affected policy acceptance and compliance, could provide valuable insights for engendering public
 642 support in the handling of future crises.

643 Third, given the limited published record on the effects of the crisis, it is possible that information on
 644 policies and their effects in certain countries may be overrepresented and too little data may be
 645 available for other countries. However, countries varied in the types and combination of measures
 646 implemented, the timing thereof, and in public compliance rates (cf. Bylund & Packard, 2021). It is
 647 therefore possible that specific combinations of measures in policy packages, their timing, and
 648 cultural differences in terms of trust in government, interact in predicting public compliance and
 649 policy outcomes. Therefore, as more information becomes available, future research would benefit
 650 from engaging in more fine-grained analyses that take into account not only the decision-making
 651 process but also such possible interactive effects. This is critical in distilling learnings from the
 652 current crisis that could provide a solid evidence-base for handling future crises. Finally, our review
 653 is not exhaustive as our main intent was to provide a framework for identifying potential errors and
 654 biases in the decision-making processes surrounding the COVID-19 crisis. As more evidence
 655 becomes available, future research would benefit from engaging in a systematic review of
 656 policymakers' decision-making processes and their outcomes.

657 3.3 Conclusions

658 In the current crisis, the risk of biases and errors in policymakers' decision-making processes has the
 659 potential to cause widespread societal damages. We identified, groupthink, a narrow focus on the
 660 problem of containing the virus, and escalation of commitment as posing real risks to decision-
 661 making processes in handling the COVID-19 crisis. Hence, it is vital that policymakers take steps to
 662 maximize the quality of the decision-making process and increase the chances of positive outcomes
 663 as the crisis goes forward. Implementing a reflexive decision-making process could help
 664 policymakers going forward by minimizing the occurrence of information-processing errors and by
 665 facilitating the emergence of more holistic approaches that balance a variety of concerns, such as
 666 public (mental) health, the economy, and human rights.

667
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 669 of any commercial or financial relationships that could be construed as a potential conflict of interest.

670
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 673 content; approved the final version of this manuscript; and agreed to be accountable for all aspects of
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² <https://www.centerforhealthsecurity.org/event201/>

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1091 Table 1

1092 Overview of checklist items to ensure minimization of groupthink. Adapted from (Janis & Mann,
1093 1977)

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- Allowing team members the chance to critically assess the actions of the group and promotes criticism of his judgements.
 - The leader / manager is impartial and does not state their personal opinions, especially at the beginning of the discussion
 - When a complex problem must be addressed, the team works it out in parallel groups, and then returns to discuss it as a whole afterwards
 - When evaluating the feasibility and effectiveness of certain decisions, the group occasionally splits into two or more subgroups for discussions
 - Each group member regularly discusses the direction of the group with third parties from outside the team, and seeks feedback on the group process
 - Outside experts are invited to contribute to the discussion
 - A group member is assigned to the role of “devil’s advocate “during meetings, and their role is to highlight the disadvantages of any discussed actions, in order to promote the discussion about consequences
 - Organize a second chance assessment, in which after reaching a provision consensus, group members will still get the chance to consider a second opinion, with a chance for reconsideration
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