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Studies in Communication and Media

FULL PAPER

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Abstract: How citizens perceive social crises is heavily influenced by the information sources they use and their individual characteristics. These strongly impact how the information received is processed and interpreted. This should also be true in the case of the COVID-19 pandemic that started to shake up the world in early 2020. Based on recent research in political communication, we hypothesize that institutional trust in media, politics, and science, as well as right-wing populist attitudes, should influence how people think about this crisis, which was managed by politics based on scientific expertise and covered intensively by the media. Therefore, this paper asks how the use of different information sources, the trust in these sources, and right-wing populist attitudes influenced the perception of the severity of the COVID-19 pandemic during the first phase of the first lockdown in Germany. It draws on data from a quantitative online quota-survey of German citizens and concludes on the basis of segmentation analysis, first, that even in the early days of the pandemic, sizeable segments of the population were either skeptical or completely denied the risks of the pandemic, questioned the scientific consensus around it and rejected mitigating measures. Second, besides right-wing populist attitudes and several other factors, the segments significantly differed in their degree of trust in traditional media, politics, and science as sources of information. We discuss the results in light of the necessity to build, preserve, and restore trust in media, science, and politics as a prerequisite for crisis prevention, communication, and management.

Keywords: COVID-19, pandemic, media trust, science trust, political trust, right-wing populist attitudes, populism, segmentation.

Zusammenfassung: Wie Bürgerinnen und Bürger soziale Krisen wahrnehmen, wird stark von den Informationsquellen, die sie nutzen, und von ihren individuellen Eigenschaften beeinflusst. Diese wirken sich stark darauf aus, wie die erhaltenen Informationen verarbei-

tet und interpretiert werden. Dies dürfte auch für die COVID-19-Pandemie gelten, die Anfang 2020 die Welt zu erschüttern begann. Auf der Grundlage neuerer Forschungen zur politischen Kommunikation stellen wir die Hypothese auf, dass institutionelles Vertrauen in Medien, Politik und Wissenschaft sowie rechtspopulistische Einstellungen die Art und Weise beeinflussen, wie Menschen über diese Krise denken, die von der Politik auf der Grundlage wissenschaftlicher Expertise gemanagt und von verschiedenen Medien intensiv behandelt wurde. In diesem Beitrag wird daher der Frage nachgegangen, wie die Nutzung verschiedener Informationsquellen, das Vertrauen in diese Quellen und rechtspopulistische Einstellungen die Wahrnehmung der Schwere der COVID-19-Pandemie während der ersten Phase des ersten Lockdowns in Deutschland beeinflusst haben. Die Studie stützt sich auf Daten einer quantitativen Online-Quotenbefragung von Bundesbürgern und -bürgerinnen und kommt auf der Grundlage einer Segmentierungsanalyse zu dem Schluss, dass erstens bereits in den ersten Tagen der Pandemie Teile der Bevölkerung die Risiken der Pandemie entweder skeptisch sahen oder ganz leugneten, den wissenschaftlichen Konsens in Frage stellten und Maßnahmen zur Eindämmung der Pandemie ablehnten. Zweitens unterschieden sich die identifizierten Segmente neben rechtspopulistischen Einstellungen und mehreren anderen Faktoren erheblich in ihrem Vertrauen in traditionelle Medien, Politik und Wissenschaft als Informationsquellen. Wir diskutieren die Ergebnisse vor dem Hintergrund der Notwendigkeit, Vertrauen in Medien, Wissenschaft und Politik aufzubauen, zu erhalten und wiederherzustellen, um Krisenprävention, -kommunikation und -management zu ermöglichen.

Schlagwörter: Rechtspopulismus, Institutionelles Vertrauen, Informationsnutzung, Covid-19, Pandemie, Typologie.

1. Introduction

Societal crises cause widespread uncertainty and might give rise to societal instability (e.g., Funke et al., 2016; Spence & Lachlan, 2016). We can assume that uncertainty was also widespread in the early phase of the COVID-19 pandemic in March and April 2020 because the world was confronted with the outbreak of a new contagious disease. With limited pre-existing knowledge at hand, science, politics, media, and citizens had to learn in real-time about the threat as the virus spread. Therefore, it is very likely that this situation created considerable uncertainty, ambiguity, and fear among the public regarding the potential threat of the virus. In addition, uncertainty probably also pertained to the understanding and validity of scientific evidence, the actions of political institutions to contain the virus, and, more generally, the pandemic-related information provided by citizens' most important sources of information: the media. In Germany, for example, news coverage and interest in the pandemic grew exponentially between late February and mid-March, 2020 (e.g., Maurer et al., 2021; Weiß et al., 2020).

Given the key role of media sources and the downsides of the new hybrid media ecosystem of traditional, social, and so-called alternative media, concerns were quickly voiced regarding the potential dangers of inconsistent communication and misinformation that spread online. As early as mid-February 2020, the Director-General of the World Health Organization (WHO) stated publicly: "We're not just fighting an epidemic; we're fighting an infodemic" (UN.org,

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2020). In fact, first studies show that during the early stages of the pandemic, extremist actors distributed content that contributed "to a contradictory, menacing, and distrusting worldview" (Boberg et al., 2020, p.1).

This focus given to the information environment early on in the pandemic seems justified because citizens' perception of social problems and crises is heavily influenced by the sources of information they turn to and the information they receive from them. However, perceptions of crises are not only affected by the actual information provided but also by individual predispositions because these can have a strong impact on information processing and interpretation (e.g., Valkenburg & Peter, 2013). Therefore, differences in both source repertoires and predispositions can result in differing knowledge about an issue, attitudes towards it, and support of policy measures aimed at tackling them. This means that people not only tend to select sources based on individual characteristics like their trust in those sources (e.g., Fawzi, 2019; Schulz et al., 2020) or their political attitudes and party preferences (e.g., Hameleers et al., 2017 a), but that the subsequent understanding and evaluation of the information is shaped, too, by predispositions, leading to motivated reasoning (e.g., Taber & Lodge, 2006). This has not only been shown for political party cues or polarized issues (e.g., Kahan, 2013), but also in the context of science-based issues like climate change (e.g., Druckman & McGrath, 2019; Hart & Nisbet, 2012) and vaccination (e.g., van Stekelenburg et al., 2020), although there is evidence that suggests that effects might be smaller for science-related issues (e.g., Kahan et al., 2013).

Against this backdrop, this paper asks how the use of different kinds of information sources, the trust in these sources, and a specific kind of political predispositions, right-wing populist attitudes, influenced the perception of the COVID-19 pandemic a few weeks after the first nationwide lockdown in Germany in early April 2020. We regard this to be a relevant topic of inquiry because we assume that perceptions of the pandemic will likely impact not only how subsequent measures to fight the pandemic will be perceived but also future behavior like following official Corona guidelines and getting vaccinated. Given the recent rise of right-wing populism in Europe and beyond, we regard right-wing populist attitudes as a potential key factor in this context because research has shown that citizens holding right-wing populist attitudes are not only skeptical towards established parties and traditional media but also towards science and scientists (e.g., Mede & Schäfer, 2020; Merkley, 2020). As we can assume that the media and science played a crucial role in citizens' perception of the pandemic and the political decisions about it, right-wing populist attitudes come into focus as a possible explanation for potential perceptual gaps among citizens.

In addition to populism research, we rely on the literature on audience segmentation, the role of media use, and the effects of institutional trust in relation to science-related issues to develop our research questions and hypotheses. We will answer and test these based on a quantitative online quota-survey of German citizens ($N = 1,820$) using a segmentation analysis and analyses of group differences with multinomial logistic regressions. We conclude that even in the early days of the pandemic, sizeable segments of the German population were either skeptical or completely denied the risks of the pandemic, questioned the scientific

consensus around it, and rejected mitigating measures. Moreover, we show that trust in sources and right-wing populist attitudes were significant drivers of these differences in perceptions.

2. Literature review

While citizens always depend on the information provided by traditional, online, and social media as well as politics and science, this is especially true in times of crisis. Typically, political, health, or natural disaster crises are characterized by a high degree of uncertainty, and therefore, the need for orientation and media dependency is high among citizens (e.g., Funke et al., 2016; Lowrey, 2004; Spence & Lachlan, 2016). This should be especially true in a developing pandemic in which science, politics, media, and the public are confronted with a completely unknown disease and in which decision-makers turn to drastic public health measures unknown to most of the countries before. In addition, we know that different information sources may vary in their portrayal of a crisis and that different parts of an audience may select and interpret information depending on pre-existing attitudes and worldviews (motivated reasoning; Kunda, 1990). The combination of these processes may result in a situation where different parts of the population hold fundamentally differing views of a problem that should in principle be well-suited for an accurate description everybody can agree on because it is based on a scientific consensus. However, as prior research has shown, the perception of science-related issues, too, is not immune to the effects of selection bias and motivated reasoning.

2.1 Audience segmentation for science-related issues

Typically, communication studies use individual-level analysis to address questions related to media use, information processing, and effects. However, in recent years analyses at the level of groups or milieus have become increasingly popular, especially in research on science-related fields such as health (e.g., Bostrom et al., 2013), environmental and climate change (Featherstone et al., 2009; Hine et al., 2017), and science communication in general (e.g., Schäfer et al., 2018). Such studies often use *audience segmentation analyses* which divides a given population "… into relatively homogeneous, mutually exclusive subgroups that share common profiles based on demographics, values, beliefs, behaviors, and/or position …" (Hine et al., 2017, p. 66). These subgroups are called *segments*, *clusters*, *types*, or *interpretative communities*. In applied market research or in the preparation of communication campaigns, audience segmentation is used to "… design messages and select communications channels that best match the characteristics of specific segments, a process known as message targeting" (Hine et al., 2017, p. 66). Also, as the term *interpretive communities* suggests, these groups can be thought of as collectives that share common viewpoints and perceptions, that potentially interact closely, and that are predisposed to similar specific interpretations of events and information. Against this backdrop, we chose a segmentation approach because we wanted to highlight the fact that the population can not

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only be thought of as a mass of individual audience members but also as a constellation of distinct milieus (or target audiences) that would need to be addressed differently by, for example, health-related information campaigns (for similar approaches concerning COVID-19 misinformation and vaccination intentions see Agley & Xiao, 2021 and Rountree & Prentice, 2021; more generally Hine et al., 2017).

Audience segmentation has been especially popular in research on climate change communication in order to better understand citizen's perceptions of the issue, to identify strategies to combat misperceptions, to motivate people to climate-friendly behavior and the support of climate-mitigating measures. Maybe the most prominent study in this context has been Yale's "Six Americas"-project (see Goldberg et al., 2020, for the latest wave). Based on various climate-related characteristics, the research group has since tracked the size and composition of various segments of the US population that differ in both their perception of the issue and their issue-related behavior. Since then, similar segmentation analyses have been conducted for India (Leiserowitz et al., 2013), Australia (Morrison et al., 2013), or Germany (Metag et al., 2017). Slightly different questions have been used in various studies to determine climate segments. For example, US studies started with a scale using 36 items, including questions on climate change beliefs, risk perceptions, issue involvement, policy support, and climate-related behaviors, followed by scales using 15 and four items, respectively (Chryst et al., 2018).

Because a pandemic is similar to climate change due to its global reach, because its assessment is also based on scientific findings, and because the so-called *Hygiene-* or *Corona- demonstrations* raised the question in the German public about the composition of the group of demonstrators opposing Corona measures (e.g., Marquart, 2020; Stöber, 2020) this paper borrows from research into climate-related audience segments and looks for Corona-related segments in the German population. We use criteria similar to some that have been relevant in explaining climate-relevant behaviors and in separating climate segments. These serve as so-called *cluster-building variables* (e.g., Chryst et al., 2018; Hornsey et al., 2016). More specifically, we asked people for (a) pandemic related beliefs (e.g., if containment is still possible), (b) personal involvement with the issue, (c) support of pandemic mitigating policies, (d) subjective knowledge about the pandemic, and (e) perceived scientific consensus on the issue. The latter is not typically part of climate segmentation studies. However, research has shown that the perception of scientific consensus goes along with, for example, greater acceptance of anthropogenic climate change (e.g., Hornsey et al., 2016) and that consensus messages can change attitudes towards climate change (e.g., Myers et al., 2015). Moreover, it was apparent early in the pandemic that individual actors were challenging the mainstream of experts on the pandemic and that the scientific consensus was questioned especially from right-wing populists (e.g., Lehmann & Zehnter, 2022). Therefore, we put forward our first research question:

> *RQ1: What segments can be distinguished in the German population based on their perceptions of the pandemic?*

2.2 Differences between audience segments

In addition to just identifying COVID-19 segments based on several variables reflecting perceptions of the pandemic (*cluster-building variables*), we are also interested in how segment members differ along their demographics, media use, institutional trust, political attitudes, and voting intentions. In classical individual-level analyses, these characteristics would typically be used as predictors of individual COVID-related perceptions. In this paper, they they first serve as so-called *cluster-describing* variables in our bivariate analyses and second as predictors of individual segment affiliation in our multivariate analysis. Therefore, we ask for potential differences between Corona clusters and put forward RQ2:

> *RQ2: How do the COVID-19 segments differ in demographics, media use, institutional trust, political attitudes, and voting intentions?*

Secondly, we assume that media use, trust in sources of information about the pandemic, and right-wing populist attitudes will predict belonging to Corona clusters. In the following, we will explain why we think that this should be the case.

As research has shown, health-related crises like pandemics as well as other crises can lead to drastic increases in media use. Which media and other sources of information citizens use can affect the way they perceive a crisis, how they behave, and whether they follow official guidelines (e.g., Spence & Lachlan, 2016). We assume that this should also be true for the early phase of the COVID-19 pandemic in Germany through March and April 2020. Indeed, first studies have shown that the demand for news increased dramatically for both traditional and online media during that time (e.g., Deloitte, 2020; Gesellschaft für Konsumforschung [GfK], 2020; Nielsen, 2020), a development that was, of course, exacerbated by the fact that Germany (and other countries) mandated a first general lockdown that kept many people at home, restricting activities aside of media use.

However, the impact of information sources in general and media, in particular, is not necessarily uniform. This is because the information and opinions people encounter in traditional journalistic media, Social Media, or so-called alternative media may considerably vary – even for issues where the scientific consensus is high. This has been shown, for example, with respect to climate change. Media might raise awareness or neglect an issue, they might strengthen or weaken trust in science, and might motivate people to engage in behavior in line with scientific suggestions or call for outright resistance against what the overwhelming majority of scientists says (e.g., Hmielowski et al., 2014; Schmidt et al., 2013). The reason for this is that even for science-based issues, coverage can differ between individual outlets and types of media. For example, while the large majority of German traditional media have long covered anthropogenic climate change as a fact and displayed a great deal of trust in climate science, coverage in the US has been much more diverse and, in part, been openly skeptical towards the scientific consensus and climate mitigating policies (e.g., Hmielowski et al., 2014; Schäfer, 2018).

In addition, online environments in general and Social Media, in particular, provide spaces for divergent views and information that challenge traditional media

coverage and the scientific consensus. Again, climate change is a case in point. In Germany, for example, climate change-skeptic counter-publics are almost completely excluded from so-called mainstream media but have found their place in comments sections and the Social Media sphere (e.g., Kaiser, 2017; Lörcher & Taddicken, 2017). First studies suggest that this gap between traditional and Social Media has also been apparent in the early phase of the COVID-19 pandemic in Germany. Whereas most traditional media did not neglect the existence of the pandemic and did not fundamentally challenge the necessity of measures to fight it (Maurer et al., 2021), so-called alternative and Social Media were much more likely to spread disinformation and conspiracy theories (e.g., Boberg et al., 2020; Quandt et al., 2020), with alternative media being defined as media viewing themselves as countering the alleged consensus and positions of traditional news outlets (e.g., Holt et al., 2019).

Because of these differences and because of the fact that people tend to turn to attitude-consistent sources, at least to a certain extent, the media usage patterns of different segments of the population may differ based on their political views and issue positions (e.g., Fawzi, 2019; Hameleers et al., 2017b). Again, this is also true for science-based issues. In Germany, for example, the group of those being especially "doubtful" about climate change considers the Internet to be a more important source of information on climate change than other segments of the population (Metag et al., 2017, p. 446). Based on these findings, we hypothesize:

> *H1a-c: The more citizens use traditional media (a), the less they use Social Media (b), and the less they use alternative media (c) to inform themselves about the pandemic, the less likely they belong to an audience segment skeptical of the urgency of the COVID-19 pandemic and policy measures to prevent its spread.*

Moreover, the Internet, Social Media, alternative media, and the live-coverage of traditional news media also provided politicians and scientists with ample opportunities to address the public directly, bypassing traditional media. And this was not only true for actors of the political and scientific mainstream but also for actors from the fringes holding minority positions. However, as the overwhelming majority of political actors and scientists regarded the pandemic as a real threat and supported measures to contain it, we put forward the following hypothesis:

> *H1d-e: The more citizens use first-hand sources from politics (d) and science (e) to inform themselves about the pandemic, the less likely they belong to an audience segment skeptical of the urgency of the COVID-19 pandemic and policy measures to prevent its spread.*

2.3 Trust and the perception of science-related issues

Not only the selection of sources but also the effects of the information provided by them depend on different kinds of audience predispositions. These predispositions may result in motivated reasoning and shape the way information is processed and interpreted. This has been shown for a variety of contexts and issues,

and it also holds true for science-related issues like climate change (Hart & Nisbet, 2012; Zhou, 2016) or vaccination (e.g., Kahan et al., 2013; van Stekelenburg et al., 2020). Depending on the specific issue, the literature has identified different kinds of predispositions that may affect the processing, interpretation, and effects of science-related information, among them political orientations, values, social identity, and also trust in politics and science.

Regarding media trust, for example, research has shown that it can moderate associations between media use, cognitions, and emotions. Especially under conditions of uncertainty, trust in sources is essential as it reduces complexity and enables trustors to act upon their beliefs. Generally, citizens who trust traditional news media are more likely to emotionally react to and arrive at perceptions and attitudes in accordance with the framing and tone of news coverage (Jackob, 2012; Ladd, 2010; Wise & McLaughlin, 2016). Moreover, trust in traditional media is typically related to trust in other social institutions like politics and science, at least in democratic systems. People trusting democratic institutions tend to trust the media more. In contrast, citizens who are cynical and alienated are also less trusting of the media as they ascribe the performance of societal and political institutions to the news media and vice versa (e.g., Ariely, 2015; Hanitzsch et al., 2018). Additionally, studies show that trust in those institutions also impacts the processing and the effects of the information provided by those institutions on science-related issues. For example, in a study by Hart and Nisbet (2012), climate-relevant knowledge only led to more climate concern among those citizens who also trusted the information provided by scientists (Gauchat, 2018; Rountree & Prentice, 2021). Therefore, we put forward our second hypothesis:

H2a-c: The more citizens trust in traditional news media (a), politics (b), and science (c), the less likely they will belong to an audience segment skeptical of the urgency of the COVID-19 pandemic and policy measures to prevent its spread.

In contrast, given the abovementioned results regarding the prevalence of non-mainstream opinions, misinformation, and conspiracy theories in alternative media and Social Media both in general (e.g., Kaiser, 2017; Lörcher & Taddicken, 2017) and in the early phase of the 2020 COVID-19 pandemic (e.g., Boberg et al., 2020; Quandt et al., 2020), we hypothesize:

H2d-e: The more citizens trust in alternative media (d) and Social Media (e), the more likely they will belong to an audience segment skeptical of the urgency of the COVID-19 pandemic and policy measures to prevent its spread.

2.4 Right-wing populist attitudes and the perception of science-related issues

The last set of predictors we take into account are *right-wing populist attitudes*. Right-wing populist attitudes are usually understood as a multidimensional concept that mirrors core ideas of right-wing populism, e.g., positive attitudes to-

wards an in-group regarding the homogeneity of the people and negative attitudes towards elites (e.g., in politics) and outgroups (e.g., immigrants, refugees) (see Castanho Silva et al., 2020, for an overview). Traditionally, the exclusion of outgroups like migrants and refugees has been associated with right-wing populism only and scholars argue that this "nativism" does not constitute a core element of populism in general, but of right-wing populism only (e.g., Hunger & Paxton, 2021; Rooduijn, 2019). More recent theorizing and empirical research have argued that the exclusion and blaming of (other) outgroups also can be regarded as a feature of left-wing populism where specific outgroups (e.g., "the rich") at times fulfil a similar function in political rhetoric and communication (e.g., Hameleers et al., 2019; Hameleers & de Vreese, 2020; Ramiro & Gomez, 2017; see also de Vreese et al., 2018). However, in this study, we will only focus on the "nativist" component of right-wing populism. Generally, we assume that citizens holding more right-wing populist attitudes will be more skeptical about established political institutions, political decision-making processes, and the substance of those decisions. However, although closely related, populist attitudes are distinct from political trust and efficacy, justifying the decision to include both trust and right-wing populist attitudes as distinct concepts in our analysis (Geurkink et al., 2020).

Moreover, right-wing populist attitudes do not only reflect skepticism towards the political establishment. Several recent studies have shown that they have an impact on patterns of media use (e.g., Hameleers et al., 2017b); on media trust and general perceptions of media (Fawzi, 2019; Schulz et al., 2020); that they are an important prerequisite for the effects of populist messages (e.g., Müller et al., 2017), and that they can themselves be affected by populist messages (e.g., Hameleers et al., 2017a; Hameleers et al., 2017b). Generally, citizens tending towards right-wing populist attitudes have a higher trust in the tabloid press and commercial TV and also use these media more frequently. This can be explained by the fact that those media tend to mirror the core values of right-wing populist audiences to a higher degree (e.g., anti-elite and anti-immigrant stances; e.g., Hameleers et al., 2017a; Krämer, 2014; Mazzoleni et al., 2003). On the other hand, citizens with right-wing populist attitudes are also more likely to consider the mainstream media as being hostile towards their own views (Schulz et al., 2020). However, this does not seem to necessarily mean that populist citizens avoid the use of broadsheets or public service TV altogether (e.g., Fawzi, 2019; Hameleers et al., 2017a; Müller & Schulz, 2019). Moreover, more populist citizens tend to be more frequent users of so-called alternative media and Social Media, which are also more likely to represent their positions and worldviews (e.g., Fawzi, 2019; Hameleers et al. 2017a; Schulz et al., 2020). One reason for these usage patterns is that citizens with more right-wing populist attitudes are more inclined to regard traditional media as part of the political establishment that is trying to manipulate them and that does not represent their worldviews (Fawzi, 2019; Schulz et al., 2020). The particular importance of the anti-elite dimension of populism assumed in this argument was supported in a recent study. It found that citizens who held stronger right-wing populist attitudes tended to distrust traditional media more and to be more critical of their performance. However, this was only

true for the anti-elite dimension of populist attitudes, but not for the attitudes around people homogeneity or anti-outgroup stances (Fawzi, 2019).

And finally, citizens holding right-wing populist attitudes are more likely to be critical towards established science, its methods, and results. This has been shown pre-pandemic most prominently in the context of climate change and is also reflected in the policies of right-wing populist parties. For example, studies have shown that European right-wing populist parties are rather unique in their skepticism regarding climate science and climate mitigation efforts (e.g., Gemenis et al., 2012; Schaller & Carius, 2019). In Germany, the right-wing populist party *Alternative for Germany* (AfD) is the only major party that does not accept the scientific consensus on climate change and rejects any climate mitigation policies, thereby polarizing the climate issue (e.g., Kammermann & Dermont, 2018; Schaller & Carius, 2019). But even more generally, science and universities have become a major target of populists. They are viewed as socially distant intellectuals and willful servants of the political establishment. In fact, populism has been described as a major driver of the trend towards post-truth politics and an increasing disdain for scientific evidence (e.g., Fraune & Knodt, 2018; van Aelst et al., 2017). A study by Huber (2020) shows that UK voters with strong populist attitudes on both sides of the political spectrum were more skeptical about the existence of man-made climate change. And more generally, recent theoretical and empirical work suggests that citizens holding more right-wing populist views are also less likely to trust science in general (e.g., Funke et al., 2016; Mede & Schäfer, 2020; Merkley, 2020; Motta, 2018).

As for the COVID-19 pandemic, the German right-wing populist AfD changed its position on the pandemic in its early stages. First attacking the government for *not* reacting quickly to the pandemic, they switched their positions to become stern critics of many Corona measures, often being close to pandemic deniers (Jungkunz, 2021). All in all, it seems likely that citizens holding stronger anti-elite right-wing populist attitudes should be more inclined to disbelief the official, expert, and media sources about the COVID-19 pandemic and to disapprove measures concerning the pandemic (see also Rountree & Prentice, 2021). Therefore, we put forward our next hypothesis:

> H3a: *The more citizens hold anti-elite populist attitudes, the more likely they will belong to an audience segment skeptical of the urgency of the COVID-19 pandemic and policy measures to prevent its spread and consequences.*

With respect to the anti-outgroup dimension of right-wing populist attitudes, it seems plausible that might play a role, too. Especially in the beginning, but also to date in the case of US Donald Trump ("China-virus"; Rogers et al., 2020), the pandemic was also painted as a threat from abroad (more specifically from Asia or China) by both media (Der Spiegel, 2020) and right-wing extremists on the Internet which even lead to anti-Asian and sinophobic harassment online and offline (Priebe, 2020; FADA, 2021). This suggests that right-wing anti-outgroup attitudes might lead to perceiving the pandemic as *more serious* and policy measures as more justified because the origin of the pandemic fits xenophobic stereo-

types. This would mean that different dimensions of right-wing populist attitudes might work in different directions here. Therefore, we put forward *H3b*:

> *H3b: The more citizens hold right-wing anti-outgroup populist attitudes, the less likely they will belong to an audience segment skeptical of the urgency of the COVID-19 pandemic and policy measures to prevent its spread.*

And finally, it is not entirely clear how perceiving the people as a homogenous entity might at all be related to the perception of the Corona crisis. Therefore, we put forward RQ3:

> *RQ3: How does the people homogeneity dimension of populist attitudes relate to the perception of the COVID-19 pandemic and policy measures to prevent its spread?*

3. Method

3.1 Design

A quantitative online survey was conducted between April 1 and April 4, 2020, about ten days after the first national lockdown starting on March 23. Quota sampling and data collection were done by Dynata survey institute (https://www.dynata.com) using members of their online access-panel. Participants in this study were German citizens between the ages of 18 and 65, and they were incentivized for their participation. Quotas resembling the structure of the German adult population were set for age, gender, and educational level. Because of the quota-sampling applied, no meaningful *response rate* can be given. However, we can calculate a participation rate based on the number of panelists who accessed the introductory page of the survey ($N = 4,139$). Of these, 319 (7.71%) ended the interview with the starting page on which the topic of the survey was described as "the spread of the Corona-pandemic". Another 1,469 participants (35.49%) were screened out on page two of the questionnaire because they did not fit the quota-criteria needed at the time of their participation (age, gender, education). And finally, 172 participants dropped out at some point during the questionnaire (4.16%). This means that 52.65% of all panelists accessing the questionnaire at all, and 92.68% of all panelists passing the quota-screening completed the questionnaire.

3.2 Sample

Of 2,179 participants completing the questionnaire, we excluded 359 (16.48%) for three reasons: First, because of short survey duration (completion time less than six minutes). Second, because of response patterns (straight-lining). Third, because of too many missing answers (30% or more). The final study sample consisted of $N = 1,820$ participants (54.71% female). The mean age of the participants was 46.60 years ($SD = 12.97$). About half of the participants had a high school education (52.37%). The medium completion time for the final sample

was 23.21 minutes (*M* = 24.87 minutes; *SD* = 9.63 minutes). The distribution of the quota variables was only marginally affected by the quality-driven exclusion of cases. In addition to the quota variables, the final sample also resembles the German adult population with respect to their location of residence in the German federal states and their voting intentions. Therefore, no weights were applied in the following analyses.

3.3 Measures

The wording of all questions is documented in the Appendix (translations from German). Original German versions of the questions are available from the authors.

Outcome variable: Perceptions of the COVID-19 pandemic. To understand individual perceptions of the pandemic, we asked for respondents' (a) pandemic related beliefs (e.g., if containment is still possible), (b) personal involvement with the issue, (b) general support of pandemic-mitigating policies, (d) subjective knowledge about the pandemic, and (e) perceived scientific consensus on the issue. Each aspect was covered by two items that used a 7-point Likert scale ranging from 1 = *does not apply at all* to 7 = *fully applies*. Respondents could also opt to answer "don't know / can't say". These ten items are the basis for our segmentation analysis (*cluster-building variables*).

Independent variables: Use of sources. We asked participants how often they had used different sources to inform themselves about the COVID-19 pandemic since the start of the national lockdown on March 23, 2020. We used a 6-point Likert scale ranging from 1 = *never*, 2 = *once a week*, 3 = *several times a week*, 4 = *daily*, and 5 = *several times a day* to 6 = *actually constantly* and asked for the usage of traditional news media (*M* = 4.43, *SD* = 1.25), social media (*M* = 2.56, *SD* = 1.67), alternative media (*M* = 1.74, *SD* = 1.34), political sources (*M* = 2.36, *SD* = 1.49), and scientific sources (*M* = 2.56, *SD* = 1.49). In addition, respondents could opt for "don't know / does not apply".

Trust in sources. To measure trust, we asked participants how great their trust in these sources was for information about the pandemic on a 7-point Likert scale ranging from 1 = *no trust at all* to 7 = *very great trust*. Here, too, respondents could opt for "don't know / does not apply" and they were asked for their trust in traditional news media (*M* = 5.35, *SD* = 1.58), social media (*M* = 2.84 *SD* = 1.75), alternative media (*M* = 3.06, *SD* = 1.80), political sources (*M* = 4.36, *SD* = 1.79), and scientific sources (*M* = 5.08, *SD* = 1.71).

Right-wing populist attitudes. In order to assess right-wing populist attitudes, a 9-item scale was administered (7-point Likert scale ranging from 1 = *does not apply at all* to 7 = *fully applies* plus an option for *"don't know"*). The measures used here were developed based on, for example, Akkerman et al. (2014) as well as Schulz et al. (2018), and were extended with items tapping into the anti-outgroup, exclusionary dimension of (right-wing) populism, here with a focus on anti-immigrant attitudes. These items have also recently been used in a large-scale comparative experiment documented in, for example, Andreadis et al. (2019). Based on these studies, three dimensions were differentiated: *People Homogeneity*

(3 items, α = .72, *M* = 4.02, *SD* = 1.35), *Anti-Elite* (3 items, α = .81, *M* = 4.75, *SD* = 1.47), and *Anti-Outgroup* (3 items, α = .91, *M* = 3.65, *SD* = 1.97) stances.

Voting intentions. We asked participants which party they would vote for if there was a national election held next Sunday. All six major parties were given as options (CDU/CSU; SPD; Green Party; AfD; The Left; FDP) plus options for "other", "would not vote", and "do not know".[1]

Political attitude extremity. We used an 11-point left-right scale to measure political positioning. Besides the scale, respondents could also opt for "don't know / does not apply to me". For our analyses, we re-coded the original scale to reflect political attitude extremity by substituting the original values with the absolute value of their difference to the center. This means, for example, that respondents positioning themselves in the political center ("6") were assigned a value of "0" and respondents positioning themselves on the political extremes ("1" or "11") were assigned a value if "5" (*M* = 1.40, *SD* = 1.53).

Controls. We controlled for gender (male = 0; female = 1), age, and formal education (less than 12/13 years of school education = 0; at least 12/13 years of school education (Abitur) = 1), and political interest (7-point Likert scale ranging from 1 = *does not apply at all* to 7 = *fully applies* plus an option for *"don't know"*).

3.4 Analysis

To answer *RQ1*, we apply centroid-based cluster analysis. To identify distinct segments of the population concerning their perception of the COVID-19 pandemic, we used K-Means Clustering. In order to avoid a further exclusion of participants, missing answers were replaced with the center of the 7-point Likert scale (= 4). We tested the robustness of this procedure by comparing the results with those of a cluster-analysis without the imputation of missing answers. 1,470 (97.16%) of the then remaining 1,513 respondents would have been assigned to the same clusters. Replacing missing answers with the sample mean for each of the variables would have led to very different clusters. To answer *RQ2*, we apply (M)ANOVAs with post-hoc tests and chi^2-tests. And to test hypotheses 3-5, we apply multinomial logistic regression that calculates the probability of a category membership – our climate segments – based on a set of independent variables. The basis for the regression analysis is reduced to *N* = 1,199 mainly due to missing values for the questions on trust in alternative media, politics, and science that produced a considerable number of "don't know" answers. We checked whether this reduction changes the basic patterns of results by re-running the analyses without the relevant trust items and also taking into account our bivariate analyses. In fact, only one predictor in one of the pairwise comparisons seems to be affected: While the bivariate analyses and the analyses without the trust items did

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1   7.64 percent of respondents said they would not vote in the election and 15.22 percent said they "do not know". In the following we document percentage shares for parties based on all respondents that opted for one of the parties (77.14 %) excluding those who would not vote or did not know.

not show a significant difference between *Educated Doubtful* and *Populist Deniers* regarding anti-outgroup sentiments, a multinomial regression with the reduced number of cases shows a week but significant effect which seems to indicate that the *Educated Doubtful* were *more* critical towards outgroups. However, this result has to be taken with caution because members of the *Educated Doubtful* segment that were excluded because of missing answers to the question on trust in alternative media were obviously less critical of outgroups and the remaining respondents more critical, producing the effects described above.

4. Results

4.1 Germany's four COVID-19 segments

Table 1 provides an overview of the general perception of the Corona pandemic as well as the differences between the segments. Even at the early stage of the pandemic in March 2020, Germans overall felt that they were quite well informed about the virus and the necessary measures. At the same time, many were concerned about the pandemic in general and a possible breakdown of the health-care system. When it comes to scientists, a considerable number of Germans did see a scientific consensus on the pandemic. And finally, a majority did not rate the measures against the spread of the virus to be excessive. This is basically in line with prior research (e.g., Blom et al., 2020; COSMO, 2020).

Using cluster analysis, we identified four COVID-19 segments of differing sizes. Labels for the clusters were chosen by the authors based on both the cluster-building and cluster-describing characteristics (Table 2) as well as the respective differences between clusters. The biggest segment made up 35.60 percent of the sample and was called *Trusting Citizens*. The second-largest was the segment of *Insecure Supporters* (32.97%), followed by *Educated Doubtful* (16.81%) and *Populist Deniers* (14.62%).

The segments did not differ in all aspects that were used in the segmentation. Table 1 is sorted based on the differences between the clusters. First, they differed in their assessment of the appropriateness of the measures to fight the pandemic: The *Trusting Citizens* and the *Insecure Supporters* largely supported the measures. The *Educated Doubtful* and even more so the *Populist Deniers* perceived the measures as going too far. However, the *Educated Doubtful* felt that further "drastic measures" were necessary. They just didn't seem to agree with the measures actually chosen by the politicians. Second, there also were differences between the segments in terms of their perception of some consensus about COVID-19 among scientists. However, it is now the *Insecure Supporters* who were similar to the *Populist Deniers*. But even the Trusting Citizens and the *Educated Doubtful* saw a certain amount of disagreement within the scientific community.

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Table 1. Germany's COVID-19 segments based on perceptions of the pandemic (cluster-building variables)

	Total (N = 1,820)		Trusting Citizens (N = 648, 35.60%)	Insecure Supporters (N = 600, 32.97%)	Educated Doubtful (N = 306, 16.81%)	Populist Deniers (N = 266, 14.62%)		
	M	*SD*	*M*	*M*	*M*	*M*	*F*	η_p^2
By now, the measures against the spread of the Coronavirus are going too far.	2.75	2.02	1.38	1.89	4.77	5.69	1463.44	0.707
In my point of view, the whole uproar about the Coronavirus is totally excessive.	2.50	1.91	1.28	1.83	3.83	5.45	985.72	0.620
Scientists hold the same views on Corona.	4.25	1.72	5.37	3.23	5.18	2.74	513.35	0.459
Science is largely in agreement on the subject of the Coronavirus.	4.44	1.73	5.62	3.47	5.26	2.85	510.68	0.458
Further radical measures have to be taken by public authorities to contain the Corona pandemic.	4.88	1.89	5.69	5.12	4.88	2.36	311.82	0.340
At the moment, I am concerned about the spread of the Coronavirus.	5.45	1.65	6.08	5.37	5.60	3.90	135.11	0.182
I am well informed about the Coronavirus.	5.62	1.24	6.21	5.10	5.77	5.23	111.35	0.155
I know well what can be done against the spread of the Coronavirus.	5.62	1.35	6.22	5.00	5.86	5.29	109.58	0.153

Currently, containment of the Coronavirus is still possible in Germany.	4.95	1.63	5.53	4.16	5.40	4.78	100.82	0.143
It is currently still possible to prevent the healthcare system from being overwhelmed by the virus.	5.06	1.55	5.62	4.36	5.45	4.83	92.74	0.133

Note: Values in columns marked with "*M*" indicate mean values on a 7-point Likert scale ranging from 1 = *does not apply at all* to 7 = *fully applies.*

Figure 1 takes two key cluster-building items to illustrate the position of the segments in a coordinate system in which the x-axis indicates the approval of the statement that measures against the pandemic are "going too far," and the Y-axis marks the approval of the statements that "scientists hold the same views" on the pandemic. The figure illustrates three things: First, all four possible combinations can be found. Second, the two segments with people generally supporting the measures were bigger (combined 68.57%) than those with people for whom the measures went too far. Third, regarding the appropriateness of the measures, there is greater disagreement among the two opposing segments. Standard deviations show that the cluster of *Trusting Citizens* tends to be the most homogenous across both measures. The *Populist Deniers* and the *Educated Doubtful* are not as homogeneous as the closed circles imply.

Figure 1. Positioning of Germany's COVID-19 segments based on agreement to measures against the pandemic and perceptions of scientific consensus (cluster-building variables)
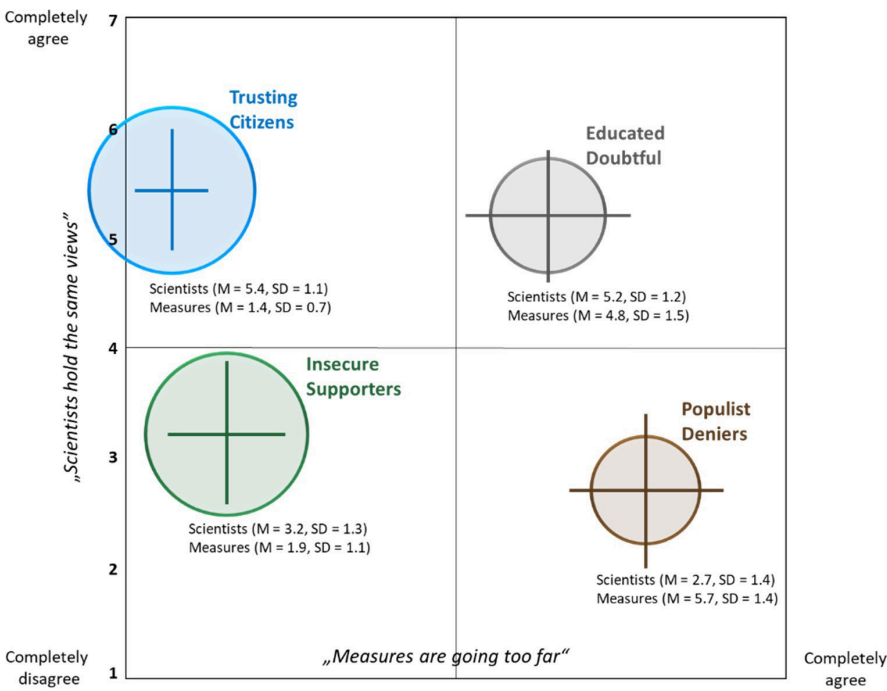
Note: Based on $N = 1{,}820$. The size of the circles is equivalent to the size of the segments. The lines in the center of the circles illustrate the standard deviation.

Taking a look at the characteristics of the segments, only minor differences can be found regarding demographics (Table 2). Segment members only marginally differ regarding age ($F(3, 1816) = 12.14$, $p < .001$, $\eta_p^2 = .020$) and education (χ^2 ($N = 1818$, $df = 12$) $= 20.19$, n.s., Cramer-V $= .064$) with the highest percentage of people with a high education can be found among the *Educated Doubtful*. Differences regarding gender are slightly bigger with the share of females varying between 59 percent (*Insecure Supporters*) and 48 percent (*Educated Doubtful*) (χ^2 ($N = 1817$, $df = 3$) $= 10.924$, $p < .05$, Cramer-V $= .078$).

As far as political attitudes are concerned, political extremity of the segments is almost identical ($F(3, 1{,}652) = 1.70$, n.s., $\eta_p^2 = .003$). However, the segments were found to differ regarding their voting intentions, χ^2 ($N = 1{,}404$, $df = 18$) $= 110.62$, $p < .001$, Cramer-V $= .162$ (see Table 2 which only includes respondents with specific party preferences). The segment of *Trusting Citizens* is dominated by voters of CDU/CSU (32.91% of the members) and the Greens (24.86%), while voters of the AfD and those who don't know who they would vote for are underrepresented. The group of *Insecure Supporters* pretty much represents the general

distribution of voters, and this is also more or less true for the *Educated Doubtful*. And finally, *Populist Deniers* stand out for their low presence of CDU/CSU (18.37%) voters and Green voters (8.67%), as well as a high share of AfD voters (26.53%) and voters of other parties (13.27%). However, voters of all parties are represented in all of the clusters, and this is even true for AfD voters. In fact, in absolute numbers, there are fewer AfD voters in the *Populist Denier* segment (52) than in the *Insecure Supporters* segment (64).

Finally, the use of the various sources of information about the Corona pandemic and the trust in these sources are noteworthy: When it comes to usage, there are no significant differences between the clusters. The situation is quite different when it comes to trust. We see a comparatively low level of trust in traditional mass media, but also political and scientific sources, among *Populist Deniers*. Remarkably, it is not the *Populist Deniers* but rather the *Educated Doubtful* that most likely trust alternative and social media.

Table 2. Characteristics of COVID-19 segments (cluster-describing variables)

	Trusting Citizens	Insecure Supporters	Educated Doubtful	Populist Deniers	Total
	(N = 648, 35.60%)	(N = 600, 32.97%)	(N = 306, 16.81%)	(N = 266, 14.62%)	(N = 1,820)
	% / M (SD)	% / M (SD)	% / M (SD)	% / M (SD)	% / M (SD)
Age	48.80 (12.11)	46.30 (13.64)	43.99 (12.96)	44.94 (12.64)	46.60 (12.97)
Higher education	50.15%	51.09%	56.72%	55.64%	52.37%
Female	52.47%	58.79%	48.04%	51.88%	53.71%
Political attitude extremity	1.32 (1.51)	1.41 (1.48)	1.38 (1.60)	1.59 (1.58)	1.40 (1.53)
Political interest	5.03 (1.70)	4.23 (1.93)	4.64 (1.82)	4.20 (2.08)	4.58 (1.89)
Voting intentions[a] / N =	547	444	217	196	1,404
CDU/CSU	32.91%	26.13%	27.19%	18.37%	27.85%
Green Party	24.86%	24.32%	21.20%	8.67%	21.87%
SPD	14.99%	13.51%	14.29%	13.27%	14.17%
AfD	6.22%	14.41%	12.90%	26.53%	12.68%
The Left	12.25%	8.56%	10.14%	11.22%	10.61%
FDP	5.12%	4.95%	8.29%	8.67%	6.05%
Other	3.66%	8.11%	5.99%	13.27%	6.77%

Right-wing populist attitudes / N =	632	584	295	260	1,771
Homogeneity	4.35 (1.37)	3.72 (1.28)	4.32 (1.23)	3.55 (1.33)	4.02 (1.35)
Anti-elite	4.35 (1.52)	4.79 (1.41)	4.79 (1.25)	5.59 (1.31)	4.75 (1.47)
Anti-outgroup	3.28 (1.96)	3.56 (1.94)	4.05 (1.86)	4.31 (1.95)	3.65 (1.97)
Use of sources / N =	648	600	306	266	1,820
Traditional media	4.73 (1.10)	4.33 (1.26)	4.34 (1.22)	4.03 (1.46)	4.43 (1.25)
Alternative media	1.63 (1.31)	1.54 (1.15)	2.08 (1.51)	2.03 (1.51)	1.74 (1.34)
Social media	2.39 (1.67)	2.46 (1.61)	2.95 (1.71)	2.72 (1.68)	2.56 (1.67)
Politics	2.53 (1.54)	2.20 (1.39)	2.52 (1.59)	2.10 (1.36)	2.36 (1.49)
Science	2.77 (1.53)	2.40 (1.44)	2.67 (1.55)	2.25 (1.36)	2.56 (1.49)
Trust in sources / N =	475	443	243	259	1,420
Traditional media	6.10 (1.02)	5.18 (1.46)	5.45 (1.41)	3.76 (1.91)	5.35 (1.51)
Alternative media	3.12 (1.89)	2.73 (1.59)	3.54 (1.80)	3.06 (1.84)	3.06 (1.80)
Social Media	2.88 (1.78)	2.61 (1.57)	3.29 (1.93)	2.71 (1.70)	2.84 (1.75)
Politics	5.05 (1.57)	4.23 (1.70)	4.36 (1.71)	3.01 (1.71)	4.36 (1.79)
Science	5.77 (1.44)	4.88 (1.64)	5.17 (1.54)	3.90 (1.78)	5.08 (1.71)

[a]*Note*: Respondents with specific voting intentions only (*N* = 1,404). Not included are respondents who were unsure, who did not answer, or who said that they would not vote.

4.2 Explaining corona segment membership

In the last part of our analysis, we take a look at the individual characteristics that predict membership in the different Corona segments. We ran multinomial logistic regressions which take one category (segment) as a reference category and then calculate which predictors make it more or less likely that a respondent belongs to a specific segment and not the reference category. For our four segments, the number of pairwise comparisons is six and we ran four multinomial logistic regressions to calculate them, each using a different segment as their reference category. To reduce complexity, we concentrate on overarching patterns and the most striking effects instead of describing all coefficients for all pairwise comparisons in detail. However, all pairwise comparisons are visualized in Figure 2, which depicts significant predictors ordered according to the size of their respective effects (based on odds ratio = *OR*). In addition, all coefficients are documented in detail in the tables in the Appendix.

To test *H1–H3*, we include as predictors the use of and trust in various sources of information about the pandemic (traditional news media, alternative media, Social Media, politics, and science) as well as people homogeneity, anti-elite, and anti-outgroup attitudes to represent three dimensions of populist attitudes. In ad-

dition, several controls are included (age, gender, formal education, political interest, and political extremity).

All in all, our model explains about 36 percent of the variance in segment membership (Nagelkerke's R^2). In the six pairwise comparisons included in the analyses, we find 30 significant effects. Twelve of the significant effects regard different dimensions of trust, nine result from dimensions of populist attitudes, and three from the usage of different sources, political interest, and different sociodemographics, respectively. The most frequent predictor that shows up in all pairwise comparisons is trust in traditional news media. Once, it is the most important predictor and another three times the second most important factor. Trust in politics and trust in science show up three times, as is the case with the three respective dimensions of populism and political interest. The usage of alternative media makes a significant difference in two cases and using science sources once. Gender and education, respectively, are the most important predictors once; age is the least important in one case (Figure 2).

Figure 2. Factors significantly predicting membership of Corona segments (pairwise comparisons based on multinomial regression analyses).
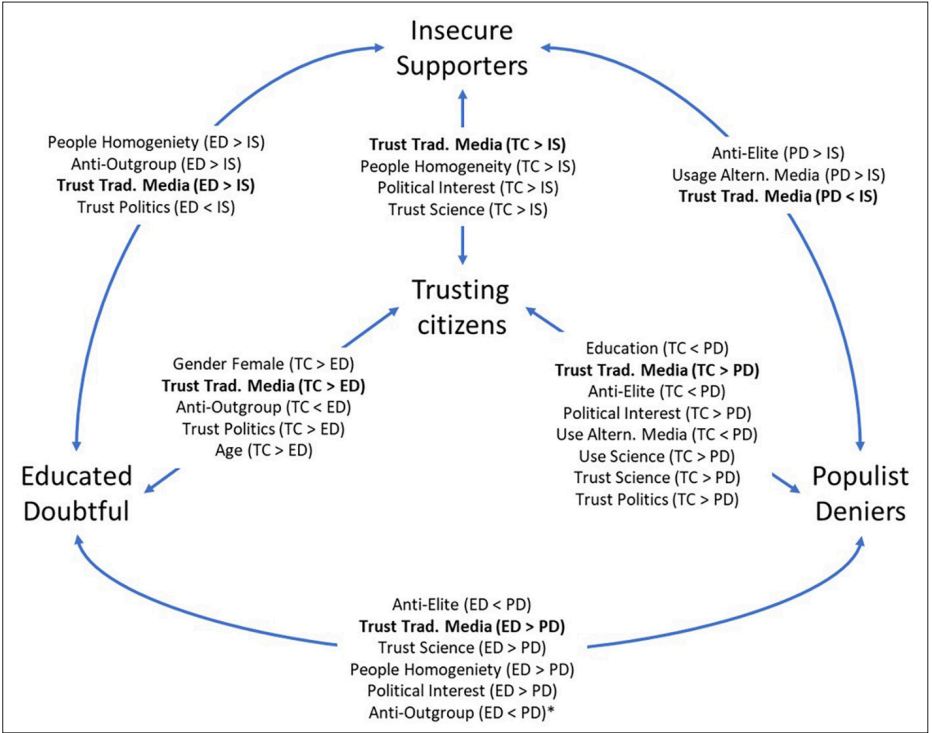
Note: Factors for pairwise comparisons are ordered according to the size of effects (based on odds ratio) (*N* = 1,199).

Taking a closer look, the *Trusting Citizens* significantly distinguish themselves from all other groups with their higher trust in traditional news media (*Educated Doubtful: OR = 0.80; Insecure Supporters: OR = 0.68; Populist Deniers (OR = 0.52*). Their higher traditional media trust is the biggest difference to the *Insecure Supporters,* a higher share of females is the biggest difference to the *Educated Doubtful*, and a lower share of highly educated members is their biggest difference to *Populist Deniers*. Comparing *Trusting Citizens* to the *Insecure Supporters,* we see that the most trusting group perceived the German people to be more homogenous[2], is more interested in politics, and has a higher trust in science. And finally, in contrast to the *Educated Doubtful, Trusting Citizens* are also less critical towards outgroups, have a higher trust in politics, and are slightly older.

Looking at the other end of the attitude spectrum, *Populist Deniers* not only differ significantly from all other groups with respect to trust in Corona-related information provided by traditional media but also in their much more critical stance towards elites, making anti-elitism the most important factor to distinguish them from both the *Insecure Supporters* and the *Educated Doubtful*. Generally, *Populist Deniers* combine a disdain for all the elites in traditional media, science, and politics with a more frequent use of alternative media that distinguishes them from both the *Trusting Citizens* and the *Insecure Supporters*. As mentioned above, *Populist Deniers* are also slightly more educated than the *Trusting Citizens*. In contrast to that, the *Educated Doubtful* differ from the *Populist Deniers* not only in their more positive stance towards elites and their higher trust in traditional media but also in their higher trust in science. All in all, our findings suggest that the *Populist Deniers* did not trust any of the sources that were crucial for communicating the nature and urgency of the crisis and therefore were not inclined to believe in it or the policy measures to counter it.

As for the *Insecure Supporters*, they are less anti-elite, less using alternative media, and more trusting in traditional news media than *Populist Deniers*. In comparison to *Trusting Citizens,* they are less trusting of traditional media, feel society to be less homogenous, are less interested in politics, and are less trusting of science. Compared to the *Educated Doubtful,* the *Insecure Supporters* also feel less that people are pulling together, are less anti-outgroup, trust less in traditional media, but more in politics. These results suggest that the fact that *Insecure Supporters* are worried about the pandemic and support policy measures in spite of a lack of trust in traditional media and science can be explained by a greater trust in politics that outbalances doubts about science and media. This group tends to perceive the German population as a "community of fate", which might contribute further to this support of public health measures.

2　This rather unexpected finding maybe traced back to the way the homogeneity-dimension was operationalized. In fact, the respective items did not ask for whether respondents would *want to* have a homogenous society, but rather how they perceived society in this respect, whether people pulled together etc. We assume that because of this, strong supporters of the Corona measures felt in line with politics, media, and most of society resulting in higher scores on the homogeneity dimension. In contrast to that, people more insecure about the measures and opponents of them may have felt to be in contrast to the "mainstream of society" and therefore did not agree as much that all of society were pulling together.

And finally, while trust in science does not differentiate the *Educated Doubtful* from the *Trusting Citizens*, less trust in classical media and politics as sources of information about the pandemic do. Moreover, people displaying stronger anti-outgroup sentiments are more likely, women and slightly older people are less likely to belong to this group than to the *Trusting Citizens*. This pattern suggests that this predominantly male group perceives the Corona crisis as less dangerous because of less trust in the political-media elites that is at least partly fueled by non-mainstream attitudes towards cultural issues like immigration (Figure 2).

5. Discussion

This paper asked (a) whether there were segments in the German population that differed in their perception of the COVID-19 in its early phase and (b) whether the use of various information sources, the trust in these sources, and right-wing populist attitudes could help to explain why citizens belonged to the various population segments. On the basis of a quantitative survey, we identified four clusters that not only differed in their perception of the severity of the crisis and the necessity for counter-measures but also in their view of the scientific consensus on the pandemic. We labeled these segments as *Trusting Citizens* (36%), *Insecure Supporters* (33%), *Educated Doubtful* (17%), and *Populist Deniers* (15%). This means that even in early April, a considerable portion of the population denied the severity of the pandemic. The 40 people that attended the first then called "hygiene-demonstration" on March 28 in Berlin were obviously not alone (Wikipedia, 2020). This finding is basically in line with other studies, which show, for example, that certain policy-measures were not approved by everybody and that feelings of threat were not shared by everyone (e.g., Blom et al., 2020; COSMO, 2020).

The major contribution of this paper, however, is that it helps (a) to understand the reasons why people did not believe in the pandemic, (b) to draw a clearer picture of the various segments of society in general and the *Populist Deniers* in particular, and (c) to also differentiate among those that generally were concerned about the pandemic and approved even far-reaching policy measures. In comparison to other recent studies using a similar approach with regard to COVID-19 misinformation (e.g., Agley & Xiao, 2021), this analysis advances our understanding especially by not only including trust in science but also other in institutions like traditional and alternative media and by taking into account populist attitudes as a rather fine-grained measurement of political predispositions. Taking the largest segment of *Trusting Citizens* as a point of reference, our analyses showed that in addition to some effects of demographics, distinct patterns of trust in specific sources and specific dimensions of right-wing populist attitudes predicted to which segments individual citizens would belong. For all groups, less trust in traditional news sources distinguished them from the Trusting Citizens, mostly so for *Insecure Supporters* and *Populist Deniers*. This skepticism toward traditional sources was either combined with significantly less trust in science (*Insecure Supporters*), in politics (*Educated Doubtful*), or in both elites (*Populist Deniers*). As for the most skeptical group of *Populist Deniers*, they also were significantly more educated, used more alternative media and less scientific sources,

and tended to have a much more negative general attitude towards politicians. Probably, high formal education and negligence for experts, politics, and media made the members of this segment confident that they knew better and that they would be able to assess the "real dimension" of the pandemic by themselves (e.g., Mede & Schäfer, 2020).

What our analyses show, then, is that trust in different institutions and especially traditional media obviously played a major part in how the pandemic and the measures to counter it were perceived by citizens. Moreover, it correlated with the perception that there was no scientific consensus on the pandemic and how to fight it. This is in line with but also extends the results by Agley & Xiao (2021), who found that trust in science significantly impacted the belief in COVID-19 conspiracy narratives. This also supports findings from climate change research that has identified perceptions of scientific consensus as a driver of climate risk perceptions and climate-relevant behavior (e.g., Hornsey et al., 2016; Myers et al., 2015). In addition, these findings underline the key function that trust has in a situation of crisis when people have to rely on the information provided to them in order to arrive at a sensible assessment of a situation that may have severe health consequences (e.g., Gauchat, 2018; Hart & Nisbet, 2012) and also deal with a certain ambiguity and fluidity in the provision of information. Against the backdrop of the discussion about declining trust in media, politics, and science, our findings support the view that a low level of trust does not go without consequence even in a situation of a health crisis in which the lives of *Populist Deniers* themselves and those surrounding them may even be in danger if they ignore scientific evidence and the measures developed on the basis of scientific expertise (e.g., Gollwitzer et al., 2020). This shows how important it is to try to re-build trust in these institutions among the distrusting segment of the population, not only for the sake of these groups but for society as a whole.

With respect to the *Populist Deniers,* our findings confirm an impression that gained a lot of public attention in the discussion about the participants of the bigger Corona-demonstrations in the summer of 2020. Like the attendees of those demonstrations, the segment of *Populist Deniers* we find is rather diverse with respect to their demographic profile, but most of all regarding their party preferences. The segment is far from being dominated only by right-wing populist AfD. Instead, voters of all major parties find themselves in a coalition of deniers on the basis of distrust in certain elites in science, the media, and politics.

And finally, our analyses point to the fact that beyond the surface of general support, skepticism was already looming towards the media, politics, or science. This initial lack of trust may have provided fertile grounds for a change of mind towards the pandemic and the policy-measures to counter it as time went on. It can be assumed that especially further information tapping specifically into these initial doubts might push the members of the segments toward a more critical stance. *Insecure Supporters*, for example, might have been especially receptive to information about a lack of consensus among scientists or inconsistent findings, fast-changing evidence as well as attacks on scientists for having dishonest motives – and changed their minds when such issues were discussed to a greater extent in the summer.

5.1 Limitations

Like any study, this one has its limits, too. Some of them are a result of the fact that the research was put together on rather short notice. As a result, we relied on a commercial online-panel to administer a cross-sectional survey that was restricted to citizens 18-65. Therefore, we cannot generalize our findings to the older parts of the population that the Coronavirus especially endangered. Typical doubts that overshadow any use of online-panel survey data were countered by a strict quality control and the exclusion of a quite large number of cases.

Additionally, we cannot claim to directly investigate causal mechanisms because of the cross-sectional nature of the design. In addition, this study is a snapshot of a rather early stage of the pandemic in Germany, just 10-14 days after the lockdown began. Other studies, too, show that around that time, support for Corona measures was quite strong in public (e.g., Blom et al., 2020; COSMO, 2020). Our findings can add to these early studies a differentiation of supporters by taking a closer look into segments of the population and potentially underlying factors of perceptions of these measures.

5.2 Conclusion and future research

The results of this quota-based survey extend climate change research that also differentiated between distinct segments and their perception of the climate change debate. As our results demonstrate, such differentiation is also useful for other uncertain but highly relevant and potentially endangering issues such as the spread of a new virus with concurrent "infodemic"-like spread of information and risk communication. Our results can be taken as a starting point to further study the development of information use habits resulting from a set of certain (populist) attitudes and trust in different sources. These insights expand beyond the research on how information about pandemics is perceived and interpreted but also inform other areas in which different sources report ambivalently and under uncertainty (e.g., climate change, foreign affairs). Regarding effects in the long run, in future research, such segmentations can be used to predict certain "headwinds" in society and thereby help find early interventions. Social crises are always accompanied by disinformation, hoaxes, and the spread of conspiracy beliefs (Allport & Postman, 1946; Douglas & Sutton, 2018), this is also apparent in the course of the Corona pandemic (Boberg et al., 2020): Here, too a lack of interventions facilitates the breeding and distribution of conspiracy beliefs, networking, and rallies of otherwise unrelated groups. Relatedly, our results can inform the development of potential counter-measures aiming at re-building trust in traditional sources in media, politics, and science.

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Appendix

Wording of questions

Perception of the COVID-19 pandemic

Below are some statements about the spread of Coronavirus. Please indicate to what extent you think they apply or not.

1. By now, the measures against the spread of the Coronavirus are going too far.
2. In my point of view, the whole uproar about the Coronavirus is totally excessive.
3. Scientists hold the same views on Corona.
4. Science is largely in agreement on the subject of the Coronavirus.
5. Further radical measures have to be taken by public authorities to contain the Corona pandemic.
6. At the moment, I am concerned about the spread of the Coronavirus.
7. I am well informed about the Coronavirus.
8. I know well what can be done against the spread of the Coronavirus.
9. Currently, containment of the Coronavirus is still possible in Germany.
10. It is currently still possible to prevent the healthcare system from being overwhelmed by the virus.

7-point Likert scale ranging from 1 = *does not apply at all* to 7 = *fully applies*; additional *don't know / can't say*

Use of sources

How often have you used the following sources to inform yourself about the Corona pandemic since the start of the national lockdown on March 23, 2020?

1. News Media (Presse, Radio, Fernsehen)
2. „Alternative" Media (e.g. RT Deutsch, Compact)
3. Parties and Politics (e.g., podcasts, press conferences, websites)
4. Science (e.g., podcasts, press conferences, websites like RKI.de)
5. Social Network Sites (e.g., YouTube, Facebook, Instagram)

1 = *never*, 2 = *once a week*, 3 = *several times a week*, 4 = *daily*, and 5 = *several times a day* to 6 = *actually constantly*; additional *don't know / does not apply*

Trust in sources

And if you think again about the information sources that were just mentioned. All in all, how much confidence do you have in these sources from which you get information about the Corona pandemic?
1. News Media (Presse, Radio, Fernsehen)
2. „Alternative" Media (e.g. RT Deutsch, Compact)
3. Parties and Politics (e.g., podcasts, press conferences, websites)
4. Science (e.g., podcasts, press conferences, websites like RKI.de)
5. Social Network Sites (e.g., YouTube, Facebook, Instagram)
7-point Likert scale ranging from 1 = *no trust at all* to 7 = *very great trust*; additional *don't know / does not apply*

Populist attitudes

We are now interested in your attitudes to politics and society in general. You will find some statements below. Please indicate to what extent you think they apply or not.
1. Politicians very quickly lose touch with ordinary people.
2. Politicians make decisions that harm the interests of ordinary people.
3. There is a big gap between ordinary people and politicians.
4. Ordinary people in Germany all pull together.
5. Ordinary people in Germany share the same values.
6. Although the Germans are very different from each other, when it comes down to it, they all think the same.
7. Immigrants cost our country a lot of money that should rather be invested in our own people.
8. Immigrants are responsible for a lot of our nation's problems.
9. People who are not originally from Germany should have no rights on our social benefits.
7-point Likert scale ranging from 1 = *does not apply at all* to 7 = *fully applies*; additional *don't know*

Political attitude

In politics, people often think of "right" and "left. When you think of your own political views, where would you rank yourself on a left-right scale? 1 means "left", 11 means "right", 6 means "center".
11-point Likert scale; additional *don't know / does not apply to me*

Voting intentions

If there were a federal election next Sunday, which party would you vote for?
CDU/CSU; SPD; Green Party; AfD; The Left; FDP; other; do not know; would not vote

Table A-1. Influence on Corona segment membership
(multinomial logistic regression)

	Reference Group: **Trusting Citizens**								
	Insecure Supporters			Educated Doubtful			Populist Deniers		
	Wald	Sig	*OR*	Wald	Sig	*OR*	Wald	Sig	*OR*
Constant	49.16	.000		6.83	.009		27.25	.000	
Controls									
Age	1.77	.183	0.99	**7.86**	**.005**	**0.98**	2.06	.152	0.99
Gender (0/1)	1.53	.216	0.82	**9.02**	**.003**	**0.57**	3.37	.066	0.67
Education (0/1)	1.83	.177	1.25	3.19	.074	1.41	**7.61**	**.006**	**1.87**
Political interest	**12.40**	**.000**	**0.84**	3.24	.072	0.90	**16.10**	**.000**	**0.77**
Attitude extremity	0.20	.656	1.02	1.37	.241	1.07	0.47	.492	1.05
Populist attitudes									
Homogeneity	**11.69**	**.001**	**0.81**	0.58	.446	1.06	2.57	.109	0.87
Anti-elite	3.75	.053	1.13	0.01	.908	1.01	**17.52**	**.000**	**1.48**
Anti-outgroup	0.03	.875	1.01	**9.14**	**.003**	**1.19**	0.08	.780	1.02
Use of sources									
Traditional media	0.04	.847	1.02	0.71	.400	0.93	0.03	.868	1.02
Alternative media	0.35	.552	0.96	1.09	.297	1.09	**4.66**	**.031**	**1.23**
Social Media	1.06	.304	1.07	2.16	.141	1.11	0.00	.963	1.00
Politics	0.16	.694	0.97	0.02	.893	0.99	0.04	.838	1.02
Science	0.41	.522	0.96	0.75	.387	0.93	**5.35**	**.021**	**0.79**
Trust in sources									
Traditional media	**27.22**	**.000**	**0.68**	**7.31**	**.007**	**0.80**	55.75	.000	0.52
Alternative media	0.11	.736	1.02	3.22	.073	1.13	1.14	.285	1.09
Social Media	3.12	.078	0.89	0.09	.771	0.98	0.00	.983	1.00
Politics	0.39	.533	0.96	**6.36**	**.012**	**0.83**	4.97	.026	0.83
Science	**6.85**	**.009**	**0.85**	0.21	.647	0.97	7.40	.007	0.80

Note: OR = odds ratio; significant coefficients (*OR*) (in bold) indicate variables in which *Insecure Supporters*, *Educated Doubtful*, and *Populist Deniers* respectively differ from the reference group of *Trusting Citizens*. Based on *N* = 1,199; 621 cases were excluded for missing values in at least one of the variables included. Pseudo-R^2: Cox und Snell: .338; Nagelkerke: .363; McFadden: .155

Table A-2. Influence on Corona segment membership
(multinomial logistic regression)

	Educated Doubtful			Populist Deniers		
Reference Group: **Insecure Supporters**						
	Wald	Sig	*OR*	Wald	Sig	*OR*
Constant	15.47	.000		0.29	.589	
Controls						
Age	2.68	.102	0.99	0.22	.642	1.00
Gender (0/1)	3.64	.056	0.69	0.96	.327	0.82
Education (0/1)	0.37	.541	1.13	3.55	.059	1.49
Political interest	1.39	.238	1.07	2.26	.133	0.91
Attitude extremity	0.59	.443	1.05	0.14	.709	1.02
Populist attitudes						
Homogeneity	**13.19**	**.000**	**1.32**	1.13	.287	1.09
Anti-elite	2.18	.140	0.89	**9.14**	**.003**	**1.31**
Anti-outgroup	**8.16**	**.004**	**1.18**	0.03	.861	1.01
Use of sources						
Traditional media	1.07	.302	0.91	0.00	.986	1.00
Alternative media	2.44	.118	1.14	**7.87**	**.005**	**1.29**
Social Media	0.33	.565	1.04	0.65	.419	0.94
Politics	0.04	.845	1.02	0.25	.618	1.05
Science	0.10	.753	0.97	3.84	.050	0.83
Trust in sources						
Traditional media	4.14	.042	1.17	14.00	.000	0.75
Alternative media	2.19	.139	1.11	0.78	.378	1.07
Social Media	1.68	.195	1.10	1.95	.162	1.12
Politics	4.04	.044	0.86	3.56	.059	0.86
Science	3.10	.078	1.14	0.66	.416	0.94

Note: OR = odds ratio; significant coefficients (*OR*) indicate variables in which *Educated Doubtful* and *Populist Deniers* respectively differ from the reference group of *Insecure Supporters*. Based on *N* = 1,199; 621 cases were excluded for missing values in at least one of the variables included. Pseudo-R^2: Cox und Snell: .338; Nagelkerke: .363; McFadden: .155

Table A-3. Influence on Corona segment membership
(multinomial logistic regression)

	Reference Group: **Educated Doubtful**		
	Populist Deniers		
	Wald	Sig	*OR*
Constant	8.39	.004	
Controls			
Age	0.89	.346	1.01
Gender (0/1)	0.50	.479	1.18
Education (0/1)	1.37	.242	1.32
Political interest	5.14	.023	0.85
Attitude extremity	0.10	.751	0.98
Populist attitudes			
Homogeneity	4.56	.033	0.83
Anti-elite	14.68	.000	1.47
Anti-outgroup	5.01	.025	0.86
Use of sources			
Traditional media	0.80	.371	1.09
Alternative media	1.52	.217	1.13
Social Media	1.40	.236	0.90
Politics	0.09	.766	1.03
Science	2.36	.124	0.85
Trust in sources			
Traditional media	24.59	.000	0.65
Alternative media	0.19	.663	0.96
Social Media	0.05	.831	1.02
Politics	0.00	.978	1.00
Science	4.73	.030	0.83

Note: OR = odds ratio; significant coefficients (*OR*) indicate variables in which *Populist Deniers* respectively differ from the reference group of *Educated Doubtful*. Based on *N* = 1,199; 621 cases were excluded for missing values in at least one of the variables included. Pseudo-R^2: Cox und Snell: .338; Nagelkerke: .363; McFadden: .155