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Published in:
Frontiers in Communication

DOI (link to publication from Publisher):
[10.3389/fcomm.2021.789272](https://doi.org/10.3389/fcomm.2021.789272)

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Publication date:
2021

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Jensen, E., Pflieger, A., Lorenz, L., Jensen, A., Wagoner, B., Watzlawik, M., & Herbig, L. (2021). A repeated measures dataset on public responses to the COVID-19 Pandemic: Social norms, attitudes, behaviors, conspiracy thinking, and (mis)information. *Frontiers in Communication*, 6, [789272].
<https://doi.org/10.3389/fcomm.2021.789272>

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A Repeated Measures Dataset on Public Responses to the COVID-19 Pandemic: Social Norms, Attitudes, Behaviors, Conspiracy Thinking, and (Mis)Information

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OPEN ACCESS

Edited by:

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Specialty section:

This article was submitted to
Science and Environmental
Communication,
a section of the journal
Frontiers in Communication

Received: 04 October 2021

Accepted: 26 November 2021

Published: 16 December 2021

Citation:

Jensen EA, Pflieger A, Lorenz L,
Jensen AM, Wagoner B, Watzlawik M
and Herbig L (2021) A Repeated
Measures Dataset on Public
Responses to the COVID-19
Pandemic: Social Norms, Attitudes,
Behaviors, Conspiracy Thinking,
and (Mis)Information.
Front. Commun. 6:789272.
doi: 10.3389/fcomm.2021.789272

Keywords: COVID-19, vaccination, conspiracy theories, risk perception, information behavior

1 INTRODUCTION

The COVID-19 pandemic has highlighted social and cultural issues relevant to public health and the fundamental relationship between science and society. The pandemic has necessitated decision-making for individuals that can have life-or-death consequences. An understanding of these micro-level decisions can have social and ethical implications. For example, these decisions are affected by the socio-economic circumstances each individual faces, which collectively influence the wider course of this global pandemic. Research capable of showing valid evidence for such social and ethical dimensions may connect with improvements in public health communication, responses to emergency state measures, and efforts to mobilise pro-social behaviour. The need for evidence-based science communication has been pointed out by scholars (e.g., Jensen and Gerber, 2020). In response to this call, we provide evidence which may inform public health communication practices and improve individual decision-making in the COVID-19 and post-truth era.

Here, we present a longitudinal survey research dataset collected in Germany between October 2020 and September 2021. The social research producing this dataset was conducted as part of the Viral Communication project (viralcomm.info). The project has investigated the social and ethical dimensions of the COVID-19 pandemic in Germany. The longitudinal research has focused on attitudes, beliefs, and behaviours regarding the COVID-19 pandemic from a representative sample of individuals within the German public. The research topics specifically regard conspiracy beliefs about the pandemic, public health mitigation measures and government policies. By providing this dataset, we wish to facilitate the identification of key issues that affect recovery and resilience in response to public health crises.

2 METHODS

For this longitudinal survey research, we collected paired sample response data in Germany between October 2020 and September 2021. These methods used a repeated measures survey design conducted across three research phases. The survey instrument was developed as part of a wider range of qualitative and quantitative data collection methods employed by the Viral Communication project. Standard good practices in social research were employed, including informed consent, robust data management and anonymization procedures and use of appropriate statistical tests (see

Jensen & Laurie, 2016; Smith & Jensen, 2016). The full set of research protocols and procedures for this project were reviewed and approved by the Ethics Committee of Sigmund Freud University.

2.1 Data Collection

The research used a software solution designed for paired samples with matching between responses at the individual level, as well as automated email invitations and reminders for the questionnaires. All data collection used digital software for secure online and GDPR-compliant data collection and management provided by the research technology company Qualia Analytics. This software provides automatic matching for paired data across iterations of repeated measures within-person survey data collection by assigning each respondent a unique identifier and incorporating it into individual survey invitation links. This is a feature that was used to avoid the need to ask respondents the same socio-demographic information in each phase. This data report focuses on the repeated measures survey data collected at three separate project phases. Throughout this paper, Phase I, Phase II and Phase III refer to the first, second and third survey wave, respectively:

2.1.1 Phase I

Data collection for the phase I survey took place from October 30, 2020 to December 14, 2020. This first phase built the foundation for a wider range of data collection approaches and research methods used in the Viral Communication project by allowing respondents to opt-in to multiple research pathways. For the initial outreach of the survey campaign, postcard invitations were sent to a random population sample of 30,000 household addresses in Germany (using the German postal service's (Deutsche Post) address database), stratified based on relative population size across German federal states (DESTATIS, 2020). The postcards were designed to include instructions for how to access the respondent-facing survey, which included a request targeted at persons in the household to next have their birthday and who were at least 16 years of age to voluntarily complete the phase I survey. In total, 1,480 people responded to this initial survey resulting in a response rate of about 5%. The response rate for this survey is within the normal range for comparable sampling approaches and types of surveys (see e.g., Jensen et al., 2021b). Respondents received monetary incentives in form of prize draws to participate in each of the research pathways, including the phase I survey and both follow-up surveys.

2.1.2 Phase II

From the Phase I sample frame ($N = 1,480$), 687 eligible respondents who agreed to be invited in the Phase I survey were contacted *via* email and invited to participate in the follow-up surveys. Using the research methods for paired samples, automated email invitations were sent to those who voluntarily agreed to participate in the Phase II survey. This phase was conducted between March 02, 2021 and March 22, 2021. In total, 482 responses were collected in the Phase II survey.

2.1.3 Phase III

The same respondents who opted in for the repeated surveys were again invited to participate in the Phase III survey. This phase was conducted between August 1, 2021 and September 20, 2021. In total, 426 responses were collected in the phase III survey.

2.2 Survey Instrument

The survey instrument used closed-ended items (e.g., single- and multiple response questions, Likert-type scales, and semantic differentials). The Phase I survey instrument underwent one round of pilot testing prior to the official release in order to ensure high validity and reliability. Due to the length of the survey instrument, the online respondent-facing survey was split into two sections, including a longer main section that had the top priority variables and a shorter opt-in section. The mean time (5% trimmed) it took respondents to complete the Phase I, Phase II and Phase III survey was 33 min, 27 and 25 min, respectively. While most survey items remained identical in each project phase to enable comparisons of change over time, we implemented some changes to the survey instrument, such as removing or including new questions. These new questions were developed as a direct response to the unfolding context of the pandemic and the emerging socio-political factors relevant to pandemic mitigation responses.

2.2.1 Phase I

The initial Phase I survey included a range of socio-demographic questions aligned with the German (*Zensus 2011, 2020*) for weighting purposes. These socio-demographic questions included the following independent (predictor) variables: age group, sex, nationality group (German/other), migration background, federal state, highest school leaving qualification, and highest professional qualification.

The Phase I survey covered the following research topics as dependent (outcome) variables:

- Attitudes towards science
- COVID-19 infection history within the respondent's household
- Perceived effectiveness of voluntary COVID-19 measures
- Self-reported adherence to COVID-19 measures
- Risk perceptions and personal concerns
- Information seeking and use behaviours
- Trust in key governmental and scientific actors relevant to the pandemic in Germany
- Support for hypothetical mandatory and voluntary Influenza vaccination and COVID-19 vaccination as a pill and injection
- Ethical considerations in pandemic management
- General conspiracy-mindedness and belief in specific COVID-19 related conspiracies
- Information about respondent's household
- Political orientation and affiliation
- Use of digital devices and access to internet
- Influenza vaccination status

2.2.2 Phase II

In the follow-up Phase II survey, demographic questions were not necessary because of the use of paired samples with matching between responses that was enabled through the online survey software used for the study. This also meant that the Phase II survey was shorter in total length, focussing only on dependent (outcome) variables from Phase I. To account for unfolding aspects of the pandemic context, some survey items were removed and new questions were added. Most notably, in Germany, vaccination was a real option for some people at this stage (not a hypothetical scenario anymore), and public frustration over a long series of semi-strict COVID-19 regulations over winter were becoming increasingly visible (ZDF, 2021).

Compared to the original phase I survey, the following items or research topics were removed from the phase II survey due to reduced relevance:

- COVID-19 infection history within the respondent's household
- Support for hypothetical mandatory and voluntary Influenza vaccination and COVID-19 vaccination as a pill
- Information about respondent's household
- Use of digital devices and access to internet
- Influenza vaccination status

The Phase II survey added the following additional research topics as dependent (outcome) variables:

- Perceived effectiveness of wearing different types of masks, closing day-cares, kindergartens, schools, and non-essential shops
- Risk perception of variants worsening the pandemic situation
- COVID-19 vaccination status, experienced side-effects, and understanding of vaccination prioritisation (as this had become a real option for some socio-demographic groups)
- Experimental design to test effects of vaccines' national origins on vaccination willingness
- Experimental design to test effects of others' national origin on personal assessments of virus-related risk

2.2.3 Phase III

In the final Phase III survey, socio-demographic questions were again not necessary because of the use of paired samples with matching of Phase I, II and III responses. Research topics from Phase I and Phase II were used as dependent (outcome) variables, with removal of some items and new questions added in Phase III to adapt the survey instrument to emerging issues. Vaccination was still a major topic in Germany, particularly in light of the SARS-CoV-2 variants, the emergence of digital COVID-19 vaccination proof, the discourse of children's COVID-19 vaccination, and a potential fourth wave of infections in autumn.

We removed the following items or research topics for the Phase III survey:

- Relevant diseases in respondent's own household

- Experimental design to test effects of others' national origin on personal assessment of virus-related risk

Compared to the original Phase II survey, the Phase III survey added the following topics as dependent (outcome) variables:

- Risk perception about a potential fourth COVID-19 wave in autumn 2021
- Experimental design to test effects of different variants' national origin on personal assessment of virus-related risk
- Perception of how the delta variant's threat was represented in the media
- Support for hypothetical COVID-19 vaccination mandates on specific aspects of daily life and work
- Vaccination status and willingness to vaccinate for respondents' children
- Modification of the vaccine origin experiment (removing some vaccines and adding a more geographically diverse set of vaccines)
- Full COVID-19 vaccination status and use of digital proof of vaccination
- Respondents' participation in protests against COVID-19 regulations

3 ANALYSIS

Following each phase of data collection, survey data were cleaned and prepared for analysis, with the application of a range of inclusion criteria as filters. For example, valid cases needed to include responses for age group, sex, nationality group (German/other), migration background, federal state, highest school leaving qualification, and highest professional qualification. These inclusion criteria were strictly required due to the necessary application of weighting in subsequent analysis, which used available German census data as a reference (Zensus 2011, 2020). Weighting variables were calculated for analyses involving the main parts of the survey instrument as well as the opt-in sections.

In total, 1,480 survey entries were submitted for Phase I. However, 417 respondents were excluded for not fitting the inclusion criteria, leaving a revised sample frame total of $N = 1,063$ respondents ($\hat{p}_{\text{woman}} = 53\%$, $M_{\text{age}} = 48.9$, $SD = 18.6$ (weighted)). From the 482 respondents who participated in the Phase II survey, a total of $N = 433$ met the inclusion criteria ($\hat{p}_{\text{woman}} = 51\%$, $M_{\text{age}} = 48.1$, $SD = 17.9$ (weighted)). $N = 388$ from the 426 respondents who took part in the phase III survey met the inclusion criteria ($\hat{p}_{\text{woman}} = 51\%$, $M_{\text{age}} = 48.6$, $SD = 18.6$ (weighted)). The same inclusion criteria were applied for all three survey phases.

4 INTERPRETING THE DATASET

As the dataset involves three measurement points (i.e., Phase I, Phase II and Phase II), it is split into three sections, each of which can be identified by looking at the variable names. Variables

corresponding to the Phase I survey will have the prefix “PHASE1_”, while variables from the Phase II and Phase III surveys will have the prefix “PHASE2_” and “PHASE3_”, respectively. Exceptions to this are the socio-demographic variables from the main section of the Phase I survey.

Each questionnaire was additionally split into a main and an opt-in section, the cut-off points of which are located after the variables PHASE1_OI_AQ, PHASE2_OI_AQ and PHASE3_OI_AQ, respectively. Furthermore, three sets of two weighting variables were calculated. The first, second and third sets include weights for analyses involving Phase I, Phase II and Phase III variables, respectively. The appropriate weighting variable for analysis should be selected based on the latest survey and survey section involved. For instance, if an analysis involves a variable from the Phase II opt-in section and a variable from the Phase I main section, the appropriate weighting variable is the one for the Phase II opt-in section.

In the Phase II survey, we included two experimental set-ups. For each of the vaccination origin experiments, we included a grouping variable, PHASE2_HM_VACC_GROUP and PHASE3_HM_VACC_GROUP. The same was done for the risk assessment experiment, with PHASE2_RA_INF_GROUP being the designated grouping variable.

5 USING THE DATASET

The survey dataset provides quantitative data that allow investigation of relevant research questions for a representative sample of the population residing in Germany between 2020 and 2021 during the COVID-19 pandemic. Secondary research using this dataset may, for instance, reveal different predictors and behavioural outcomes of belief in the conspiracy that the COVID-19 pandemic is part of a global effort to enforce mandatory vaccination (Jensen et al., 2021a). By providing this dataset, we wish to facilitate the identification of key issues that affect recovery and resilience in response to public health crises.

The social research conducted to produce this dataset was part of the Viral Communication project (viralcomm.info), which focused on the following research questions:

- How do individuals and communities perceive risks and protective behaviours related to COVID-19 with regards to pro-social ethical duties and their own socio-economic situation?
- How do public understandings of the disease evolve?
- How do these public understandings vary across diverse socio-demographic groups?
- How are individuals in Germany experiencing stigmatisation and negative outcomes?
- What information are people in Germany seeking?
- What sources, (mis)information, and platforms do people in Germany regard as trusted/credible?

- How much confidence do they have in public health authorities and emergency state measures?
- What factors are associated with conspiracy theory beliefs relevant to the pandemic?
- How is conspiracy thinking affecting people’s decision-making about pandemic mitigation measures?

Overall, the longitudinal research has focused on attitudes, beliefs, and behaviours regarding the COVID-19 pandemic from a representative sample of individuals within the German public. The research topics specifically regard conspiracy beliefs about the pandemic, the social and ethical dimensions of the COVID-19 pandemic in Germany which may influence public health mitigation measures and government policies.

The dataset is accessible on the open science publication platform Zenodo: <https://doi.org/10.5281/zenodo.5546999>. It is provided as an SPSS file and includes fully anonymised and cleaned survey data for the Viral Communication project. The dataset includes all quantitative variables and other computed variables necessary for performing analyses and comparisons with follow-up or related research.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: <https://doi.org/10.5281/zenodo.5546999>.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Sigmund Freud University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors contributed to the survey design. AP and LL set up the survey system. Data collection was conceptualized by EJ, BW, and MW, and implemented by LL. AP performed the data management. AP and LL wrote up the article. EJ, AJ, BW and MW did final editing.

FUNDING

The research presented in this paper was funded by the German Federal Ministry of Education and Research under grant agreement 01KI20500.

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Conflict of Interest: AP, LL, AJ were employed by Qualia Analytics.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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