

1 Exploring Viral Communication: A Repeated Measures Dataset

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13 Abstract

14 We present a repeated measures dataset of public attitudes and behaviours related to the COVID-19
15 pandemic. The paired data were collected via a representative survey of German residents at three
16 different measurement points, spanning a one-year time frame between October 2020 and September
17 2021. Respondents were asked to answer a series of questions about their attitudes towards certain
18 virus transmission mitigation measures, risk perceptions, how they access and evaluate certain
19 sources of information, and conspiracy-related beliefs. The survey instrument was updated before
20 each data collection phase to account for emerging socio-political contexts by removing or adding
21 new survey items. Experimental designs were employed to test for nationalistic or in-group biases.

22 1 Introduction

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

34
35 Here, we present a longitudinal survey research dataset collected in Germany between October 2020
36 and September 2021. The social research producing this dataset was conducted as part of the Viral
37 Communication project (viralcomm.info). The project has investigated the social and ethical
38 dimensions of the COVID-19 pandemic in Germany. The longitudinal research has focused on
39 attitudes, beliefs, and behaviours regarding the COVID-19 pandemic from a representative sample of

40 individuals within the German public. The research topics specifically regard conspiracy beliefs
41 about the pandemic, public health mitigation measures and government policies. By providing this
42 dataset, we wish to facilitate the identification of key issues that affect recovery and resilience in
43 response to public health crises.

44 **2 Methods**

45 For this longitudinal survey research, we collected paired sample response data in Germany between
46 October 2020 and September 2021. These methods used a repeated measures survey design
47 conducted across three research phases. The survey instrument was developed as part of a wider
48 range of qualitative and quantitative data collection methods employed by the Viral Communication
49 project. Standard good practices in social research were employed, including informed consent,
50 robust data management and anonymization procedures and use of appropriate statistical tests (see
51 Jensen & Laurie, 2016; Smith & Jensen, 2016). The full set of research protocols and procedures for
52 this project were reviewed and approved by the Ethics Committee of Sigmund Freud University.

53 **2.1 Data Collection**

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

63 **2.1.1 Phase I**

64 Data collection for the Phase I survey took place from 30 October 2020 to 14 December 2020. This
65 first phase built the foundation for a wider range of data collection approaches and research methods
66 used in the Viral Communication project by allowing respondents to opt-in to multiple research
67 pathways. For the initial outreach of the survey campaign, postcard invitations were sent to a random
68 population sample of 30,000 household addresses in Germany, stratified based on relative population
69 size across German federal states (DESTATIS, 2020). The postcards were designed to include
70 instructions for how to access the respondent-facing survey, which included a request targeted at
71 persons in the household to next have their birthday and who were at least 16 years of age to
72 voluntarily complete the Phase I survey. In total, 1,480 people responded to this initial survey
73 resulting in a response rate of about 5%. Respondents received monetary incentives in form of prize
74 draws to participate in each of the research pathways, including the Phase I survey and both follow-
75 up surveys.

76 **2.1.2 Phase II**

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

82 2.1.3 Phase III

83 The same respondents who opted in for the repeated surveys were again invited to participate in the
84 Phase III survey. This phase was conducted between 1 August 2021 and 20 September 2021. In total,
85 426 responses were collected in the Phase III survey.

86 2.2 Survey Instrument

87 The survey instrument used closed-ended items (e.g., single- and multiple response questions, Likert-
88 type scales, and semantic differentials). The Phase I survey instrument underwent one round of pilot
89 testing prior to the official release in order to ensure high validity and reliability. Due to the length of
90 the survey instrument, the online respondent-facing survey was split into two sections, including a
91 longer main section that had the top priority variables and a shorter opt-in section. The mean time
92 (5% trimmed) it took respondents to complete the Phase I, Phase II and Phase III survey was 33
93 minutes, 27 minutes and 25 minutes, respectively. While most survey items remained identical in
94 each project phase to enable comparisons of change over time, we implemented some changes to the
95 survey instrument, such as removing or including new questions. These new questions were
96 developed as a direct response to the unfolding context of the pandemic and the emerging socio-
97 political factors relevant to pandemic mitigation responses.

98 2.2.1 Phase I

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

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

- 105 • Attitudes towards science
- 106 • COVID-19 infection history within the respondent's household
- 107 • Perceived effectiveness of voluntary COVID-19 measures
- 108 • Self-reported adherence to COVID-19 measures
- 109 • Risk perceptions and personal concerns
- 110 • Information seeking and use behaviours
- 111 • Trust in key governmental and scientific actors relevant to the pandemic in Germany
- 112 • Support for hypothetical mandatory and voluntary Influenza vaccination and COVID-
113 19 vaccination as a pill and injection
- 114 • Ethical considerations in pandemic management
- 115 • General conspiracy-mindedness and belief in specific COVID-19 related conspiracies
- 116 • Information about respondent's household
- 117 • Political orientation and affiliation
- 118 • Use of digital devices and access to internet
- 119 • Influenza vaccination status

120 2.2.2 Phase II

121 In the follow-up Phase II survey, demographic questions were not necessary because of the use of
122 paired samples with matching between responses that was enabled through the online survey

123 software used for the study. This also meant that the Phase II survey was shorter in total length,
124 focussing only on dependent (outcome) variables from Phase I. To account for unfolding aspects of
125 the pandemic context, some survey items were removed and new questions were added. Most
126 notably, in Germany, vaccination was a real option for some people at this stage (not a hypothetical
127 scenario anymore), and public frustration over a long series of semi-strict COVID-19 regulations
128 over winter were becoming increasingly visible (ZDF, 2021).

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

- 131 • COVID-19 infection history within the respondent's household
- 132 • Support for hypothetical mandatory and voluntary Influenza vaccination and COVID-
133 19 vaccination as a pill
- 134 • Information about respondent's household
- 135 • Use of digital devices and access to internet
- 136 • Influenza vaccination status

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

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

148 **2.2.3 Phase III**

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

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

- 157 • Relevant diseases in respondent's own household
- 158 • Experimental design to test effects of others' national origin on personal assessment of
159 virus-related risk

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

- 162 • Risk perception about a potential fourth COVID-19 wave in autumn 2021

- 163 • Experimental design to test effects of different variants' national origin on personal
- 164 assessment of virus-related risk
- 165 • Perception of how the delta variant's threat was represented in the media
- 166 • Support for hypothetical COVID-19 vaccination mandates on specific aspects of daily
- 167 life and work
- 168 • Vaccination status and willingness to vaccinate for respondents' children
- 169 • Modification of the vaccine origin experiment (removing some vaccines and adding a
- 170 more geographically diverse set of vaccines)
- 171 • Full COVID-19 vaccination status and use of digital proof of vaccination
- 172 • Respondents' participation in protests against COVID-19 regulations

173 3 Analysis

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

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

188 4 Interpreting the Dataset

189 As the dataset involves three measurement points (i.e., Phase I, Phase II and Phase II), it is split into
 190 three sections, each of which can be identified by looking at the variable names. Variables
 191 corresponding to the Phase I survey will have the prefix "PHASE1_", while variables from the Phase
 192 II and Phase III surveys will have the prefix "PHASE2_" and "PHASE3_", respectively. Exceptions
 193 to this are the socio-demographic variables from the main section of the Phase I survey.

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

202 In the Phase II survey, we included two experimental set-ups. For each of the vaccination origin
 203 experiments, we included a grouping variable, PHASE2_HM_VACC_GROUP and

204 PHASE3_HM_VACC_GROUP. The same was done for the risk assessment experiment, with
205 PHASE2_RA_INF_GROUP being the designated grouping variable.

206 **5 Using the Dataset**

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

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

- 216 • How do individuals and communities perceive risks and protective behaviours related
217 to COVID-19 with regards to pro-social ethical duties and their own socio-economic
218 situation?
- 219 • How do public understandings of the disease evolve?
- 220 • How do these public understandings vary across diverse socio-demographic groups?
- 221 • How are individuals in Germany experiencing stigmatisation and negative outcomes?
- 222 • What information are people in Germany seeking?
- 223 • What sources, (mis)information, and platforms do people in Germany regard as
224 trusted/credible?
- 225 • How much confidence do they have in public health authorities and emergency state
226 measures?
- 227 • What factors are associated with conspiracy theory beliefs relevant to the pandemic?
- 228 • How is conspiracy thinking affecting people's decision-making about pandemic
229 mitigation measures?

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

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

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