Will COVID-19-related economic worries superimpose health worries, reducing social distancing acceptance in Germany? A prospective pre-registered study

Tom Rosman[a], Martin Kerwer[a], Anita Chasiotis[a], Holger Steinmetz[a], Oliver Wedderhoff[a], Cornelia Betsch[b], and Michael Bosnjak[a]

[a] *Leibniz Institute for Psychology Information (ZPID), Universitätsring 15, 54296 Trier, Germany*

[b] *University of Erfurt, Nordhäuser Str. 63, 99089 Erfurt, Germany*

Corresponding author: Tom Rosman, Tel.: +49 6512012284, E-mail: tr@leibniz-psychology.org

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Abstract

Governmental measures such as social distancing aim at curbing the spread of the novel coronavirus, SARS-COV-2. In March 2020, a large proportion of the German population supported such measures. In this paper, we analysed whether the support for social distancing would dwindle with economic worries superimposing virus-related health worries in the months to follow. We test seven pre-registered hypotheses using data from the German COVID-19 Snapshot MOnitoring (COSMO) survey, which regularly monitors behavioural and psychological factors related to the pandemic. For the present article, we analysed the German COSMO data for the period ranging from March 24, 2020 to July 7, 2020 (N_{total} = 13,094). Results revealed that health worries decreased over time, whereas economic worries remained largely constant. Furthermore, as expected, the acceptance of social distancing considerably decreased. Health worries were positively associated with acceptance of social distancing, whereas the corresponding relationship was negative with regard to economic worries (albeit smaller and less consistent). Unexpectedly, no interactions between health worries and economic worries were found. We conclude that individual differences in health and economic threat perceptions related to COVID-19 play an important role in the acceptance of social distancing.

Keywords: COVID-19, social distancing, health worries, economic worries

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By the end of 2019, a novel coronavirus, SARS-CoV-2, emerged. Despite initial containment efforts, the virus quickly became pandemic, leading to hundreds of thousands of deaths related to the corresponding disease, COVID-19. Since no vaccine is available to date (July 2020), behavioural measures such as social distancing and personal hygiene were introduced as a practical means to control the spread of the virus. However, such behavioural measures are only effective to the extent that individuals adhere to them. As social distancing is also expected to have side effects—most notably for economic factors—monitoring the interplay of the subjective evaluation of social distancing as a viable means to curb the pandemic and expected negative effects is crucial. Correspondingly, in March 2020, the World Health Organization (WHO) Europe has published a monitoring instrument on "variables that are critical for behaviour change in the population to avoid transmission of COVID-19, including risk perceptions, trust, use of information sources, knowledge as well as barriers and drivers to recommended behaviours" (WHO Regional Office for Europe, 2020, p. 9)—in short, COVID-19 Snapshot Monitoring (COSMO; Betsch et al., 2020a). Since knowledge on the psychological factors that affect the acceptance of social distancing is still rather scarce, the present article investigates, using the COSMO data, the interplay between individual health and economic worries on the acceptance of state-imposed social distancing measures in Germany. Drawing on well-established psychological theory (e.g., Tversky & Kahneman, 1973), we investigate whether, over the period from March 24, 2020 to July 7, 2020, health worries decreased whereas economic worries increased, leading to a reduction in the acceptance of social distancing measures.

Background and Hypotheses

From March 2020 on, prohibition of gatherings, school closings, and even general curfews were enforced by a vast number of European countries. Such social distancing measures have been shown to be effective in curbing the spread of a pandemic because they reduce the likelihood that individuals catch the virus and subsequently infect other persons (Anderson et al., 2020; Hsiang et al., 2020). Social distancing measures, however, require a close monitoring of individual compliance since they entail considerable limitations to individual freedom, thus bearing potential for reactance and opposition on the part of the population.

Nevertheless, at the beginning of the pandemic, a large proportion of the German population complied with, supported, and even requested the implementation of these measures (Betsch et al., 2020b; 2020c; Rieger & Wang, 2020). From a psychological standpoint, this is hardly surprising. In fact, research on risk perception shows that humans tend to overestimate unknown, extraordinary, and emotionally salient risks, whereas they underestimate more common everyday risks (e.g., Fischhoff et al., 1978; Loewenstein et al., 2001). Moreover, because of a phenomenon called the *availability heuristic* (Tversky & Kahneman, 1973), individuals infer the likelihood of an event (e.g., a COVID-19 infection) as higher when information relating to that event is readily available (e.g., through intensive media coverage). Correspondingly, fears and worries about the virus itself might have been highest at the beginning of the pandemic—a time when the disease was rather new and its emergence was intensively covered by the media (BBVA Research, 2020). Social distancing, in turn, is well-suited to reduce these feelings of virus-related fears and worries as it reduces the number of confrontations with potentially infected other individuals. This assumption is supported by recent findings showing that fear of the virus and perceptions of its dangerousness lead to a higher compliance with social distancing (Abdelrahman, 2020;

Harper et al., 2020). Taken together, these deliberations might thus explain why the acceptance of social distancing measures was rather high at the beginning of the pandemic.

However, as of July 2020, the pandemic is far from over. While the German federal and regional governments considerably eased their social distancing measures during May and June 2020 due to low infection rates (Steinmetz et al., 2020), several new infection clusters emerged throughout June and July, entailing regional restitutions of the measures. This dynamic is in line with the widely received modelling study by Kissler and colleagues (2020), who concluded—already in March 2020—that prolonged or intermittent social distancing may be necessary for several years. In fact, without a vaccine, a considerable easing of the social distancing measures will likely lead to another increase in infections, as these measures, on their own, cannot completely eliminate the virus from the population (e.g., Lewis, 2020).

It is suggested that the longer social distancing measures are kept in place, the stronger their economic impact will be (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung [German Council of Economic Experts], 2020). In fact, such measures decrease supply and demand of non-essential goods, thus essentially "shutting down" large parts of the economy. This has drastic consequences for local retailers, shop- and barkeepers, and several service providers. Consequently, economists warn that the pandemic will have (and already has) severe economic consequences, such as substantial increases in unemployment rates and a sharp recession. For example, in June 2020, the German Council of Economic Experts predicted that Germany's gross domestic product would decrease by 6.5% over the year 2020, and the World Trade Organization (2020) estimated a year-on-year drop in the worldwide volume of merchandise trade of around 18.5% in the second quarter of 2020.

As stated above, the acceptance of social distancing measures was rather high at the beginning of the pandemic. However, as the novelty of the disease fades, worries about the virus are likely to diminish—which is in line with the availability heuristic outlined above (Tversky & Kahneman, 1973). Moreover, the expected economic downturn can be expected to increase worries regarding economic side effects as more and more people will suffer from or worry about unemployment and shortages of goods. We argue that over time, this subjective economic threat (and the corresponding individual worries) will become more important than the subjective health threat. This is for several reasons: First, the negative economic effects of social distancing take some time to become visible—for example, companies may first tap into their financial reserves before they start dismissing staff. Second, the economic crisis may become increasingly salient over time, for instance, as more and more yet unaffected people will learn about neighbours or friends losing their jobs and will be increasingly confronted with media coverage of the crisis. Third, considering that in Germany, the social distancing measures successfully reduced the rate of infections, the perceived dangerousness of the virus may decrease—a potential side effect of an otherwise successful containment strategy (a phenomenon known as the "prevention paradox"; Rose, 1981). As a result, we expect that the salience of the benefits of social distancing will be increasingly outweighed by the growing salience of potential negative economic consequences.

To sum up, we thus argue that the economic threat and the corresponding individual fears and worries will lead to a reduction in the acceptance of and adherence to social distancing measures. The recent emergence of rallies against coronavirus measures as well as the spread of COVID-19-related conspiracy theories (e.g., Georgiou et al., 2020; Imhoff & Lamberty, 2020) may serve as first evidence for such dynamics. Furthermore, we suggest that health worries and economic worries interact on an individual level, that is, the degree of economic

worries will relate to a decreasing acceptance of social distancing with decreasing levels of health worries. For example, an individual with high economic and low health worries is predisposed to strongly oppose social distancing measures since he or she is likely to perceive social distancing as unnecessary, whereas an individual with high economic and high health worries might perceive the economic turmoil caused by social distancing as an inevitable but necessary evil. Health worries might thus buffer the negative effects of economic worries on the acceptance of social distancing. Based on these considerations, we posit the following hypotheses, which have been pre-registered as of April 2, 2020 (Rosman et al., 2020).

Hypothesis 1: Worry about the novel coronavirus will gradually decrease over time in the focused time period.

Hypothesis 2: Worry about the economic consequences of the pandemic will gradually increase over time in the focused time period.

Hypothesis 3: Acceptance of social distancing measures will gradually decrease over time in the focused time period.

Hypothesis 4: Worry about the virus is positively related to the acceptance of social distancing measures.

Hypothesis 5: Worry about the economic consequences of the pandemic is negatively related to the acceptance of social distancing measures.

Hypothesis 6: There is an interaction between worry about the virus and worry about its economic consequences on the acceptance of social distancing measures: The negative relation between worry about the economic consequences and the acceptance of social distancing measures (see Hypothesis 5) is stronger if worry about the virus is low (and vice versa).

Hypothesis 7: The interaction outlined in Hypothesis 6 will become stronger over time in the focused time period.

Method

Participants, Study Design, and Procedure

We investigated the hypotheses using data from the COSMO Germany survey (Betsch et al., 2020a), a serial cross-sectional online study on behavioural and psychological factors related to the pandemic. For each COSMO data collection wave, a method and findings report is created (in German) and made publicly available via the PsychArchives repository (e.g., Betsch et al., 2020b).

Since the beginning of March 2020, the COSMO Germany data have been collected regularly (once per week until wave 13; every second week since wave 14) using non-probability-based sampling by an ISO 26362 certified online sample provider. The research design employed is multiple cross-sectional, that is, for each data collection wave, different participants are invited to participate. All participants are German-speaking residents of Germany, and are matched to the German general population as captured by census data regarding age, gender, and residency in the German federal states. Data collection waves 4 to 16 were considered for the present study, resulting in 13 waves overall and an analysis period ranging from March 24, 2020 to July 07, 2020. The average sample size per wave was *N(mean)* = 1,007, and the total sample size across all waves was *N(overall)* = 13,094. Of these 13,094 participants, 49% were female and the mean age was $M = 46.16$ ($SD = 15.82$; range: 18-87).

Measures

To test our hypotheses, we used the following set of items (in their German versions).

Health worries. Individual worries about the virus were assessed using the item "*The novel coronavirus to me feels … worrying/not worrying*", with responses recorded on a 7-point Likert scale ranging from 1 to 7.

Economic worries. Worries about the economic impact of the pandemic were measured on two levels: an individual level (worry about becoming unemployed) and a collective level (worry about recession). The following two items were used: "*At the moment, how much do you worry about … recession/becoming unemployed*", with responses recorded on a 7-point Likert scale ranging from 1 ("*don't worry at all*") to 7 ("*worry a lot*").

Acceptance of social distancing measures. Since social distancing measures are subject to changes over time, we opted against building an aggregate measure of different social distancing items, but instead investigated one central item which assesses the general rejection of social distancing measures: "*I think that the currently implemented measures are greatly exaggerated*". Similar to the worry items from above, responses to this item were recorded on a 7-point Likert scale ranging from 1 to 7 ("*strongly disagree*" to "*strongly agree*"). It is important to note that the item assesses the acceptance of social distancing measures at the time of data collection, and that the social distancing measures were gradually relaxed from mid-April onwards in Germany (Steinmetz et al., 2020). This might potentially reduce the magnitude of effects with regard to Hypothesis 3. Therefore, to gain a more precise indicator of one central social distancing measure that has been widely used, we additionally, as a secondary outcome, investigated the acceptance of stay-at-home orders using the item "*It should only be allowed to leave one's house for professional, health, or urgent reasons*", which again was responded to on a 7-point Likert scale ranging from 1 to 7.

Statistical Analysis

To facilitate the interpretation of results, items on health worries as well as on the general non-compliance with social distancing measures were inverted prior to data analysis.

Consequently, higher values on all worry/acceptance measures indicate higher levels of worry/acceptance. Moreover, we accounted for the hierarchical data structure (i.e., individuals clustered within measurement occasions) by employing multi-group structural equation models with "time" (i.e., measurement occasion) as grouping variable in R (R Core Team, 2020). We thereby used the package "lavaan" (Rosseel, 2012) and its functions on model invariance testing in multi-group models.

In a first step, we tested if mean scores on our variables differed across time (Hypotheses 1 to 3). To do this, we compared, by means of a likelihood ratio test, an unrestricted baseline model (i.e., allowing for variation in mean values across measurement occasions) to a restricted model which assumed that mean values were invariant across time. Apart from that, no assumptions on relationships between variables were made in the models we used in this first step (i.e., all intercorrelations between variables were freely estimated). After this likelihood ratio test, we inspected the amount of overlap in 95% confidence intervals (CIs) of mean scores to test whether the empirical pattern of change corresponded to the expected pattern of change outlined in Hypotheses 1 to 3.

In a second step, we examined relationships between variables within measurement occasions (Hypotheses 4 to 6) and how these relationships changed across measurement occasions (Hypothesis 7). To investigate the within-person relationships between health worries, economic worries, and acceptance, which were specified in Hypotheses 4 to 6, we predicted acceptance measures by worry variables in our multi-group model. Since we were only interested in within-person relationships in Hypotheses 4 to 6, we centred each variable on the corresponding measurement occasion mean (cf. centring within cluster; Enders & Tofighi, 2007). Moreover, to facilitate the interpretation of the estimated regression coefficients, we also divided each variable by its measurement occasion-specific standard deviation, thus obtaining standardised regression coefficients. Finally, to test Hypotheses 6

and 7, we added interaction terms to the multi-group model by multiplying these standardised variables. In line with our procedure for testing Hypotheses 1 to 3, we first tested if regression coefficients were invariant over time and decided, based on this test, whether to inspect measurement occasion-specific regression coefficients or time-invariant regression coefficients to investigate Hypotheses 4 to 6. Again in line with our procedures for the first step, Hypotheses 4 to 7 were subsequently tested based on 95% CIs[1] of standardised regression coefficients. More precisely, we examined whether regression coefficients significantly differed from zero for Hypotheses 4 to 6 (i.e., *if* there was a significant positive or negative effect), and, regarding Hypothesis 7, we inspected the amount of overlap in the CIs of the interaction effects.

One multi-group structural equation model was estimated for each step (i.e., one for Hypotheses 1-3 and one for Hypotheses 4-7). All relationships were thus analysed simultaneously and all worry measures, interaction variables, and social distancing measures were included in the same model. Therefore, our regression coefficients can be interpreted as *partial* regression coefficients (in line with "ordinary" regression coefficients in multiple regression models). Additionally, to obtain a target model that was as parsimonious as possible, we performed, for each of the two models, model invariance tests to determine if (co)variances significantly differed across measurement occasions. Finally, as specified in our pre-registration, incomplete cases (4.47%) were treated as "missing" in the multi-group model.

[1] Despite the fact that we specified one-sided hypotheses, 95% instead of 90% CIs were used for testing our hypotheses to correct for multiple testing when having two outcome variables.

Results

In our analyses on trajectories over time (i.e., the first step described in the *Statistical Analysis* section), likelihood ratio tests showed that mean values significantly differed between measurement occasions ($\Delta\chi^2 = 1641.50$, $df = 60$, $p < .001$), and that restricting variances ($\Delta\chi^2 = 129.98$, $df = 60$, $p < .001$) or covariances ($\Delta\chi^2 = 324.92$, $df = 120$ $p < .001$) also significantly impaired model fit. Thus, we inspected mean value estimates of a completely unrestricted model to test Hypotheses 1 to 3. The corresponding model-implied 95% CIs of mean values are given in Table 1.

Table 1

Means and 95% confidence intervals of study variables

Variable	Health worry		Worry about recession		Worry about becoming unemployed		Acceptance of social distancing measures in general		Acceptance of stay-at-home orders	
Date	*M*	CI	*M*	CI	*M*	CI	*M*	CI	*M*	CI
24.03.2020	5.302	5.210, 5.394	5.390	5.299, 5.481	2.821	2.694, 2.947	5.622	5.516, 5.728	5.082	4.965, 5.199
31.03.2020	5.302	5.203, 5.400	5.403	5.311, 5.495	2.926	2.798, 3.055	5.465	5.353, 5.576	4.819	4.698, 4.940
07.04.2020	4.961	4.858, 5.065	5.348	5.253, 5.442	2.874	2.747, 3.001	5.198	5.079, 5.316	4.349	4.222, 4.475
14.04.2020	4.873	4.773, 4.973	5.265	5.171, 5.358	2.745	2.619, 2.872	5.215	5.097, 5.334	4.202	4.076, 4.329
21.04.2020	4.774	4.669, 4.878	5.178	5.086, 5.269	2.671	2.551, 2.791	5.211	5.092, 5.329	3.979	3.852, 4.106
28.04.2020	4.801	4.697, 4.905	5.242	5.148, 5.337	2.772	2.648, 2.896	4.820	4.695, 4.946	3.700	3.569, 3.831
05.05.2020	4.542	4.440, 4.644	5.115	5.015, 5.215	2.717	2.591, 2.842	4.687	4.561, 4.814	3.395	3.268, 3.521
12.05.2020	4.556	4.452, 4.661	5.140	5.043, 5.237	2.742	2.615, 2.869	4.800	4.672, 4.927	3.318	3.194, 3.443
19.05.2020	4.502	4.391, 4.613	5.156	5.058, 5.254	2.785	2.656, 2.914	4.684	4.556, 4.813	3.371	3.243, 3.499
26.05.2020	4.490	4.379, 4.601	5.163	5.064, 5.262	2.866	2.734, 2.998	4.841	4.713, 4.970	3.058	2.932, 3.184
09.06.2020	4.634	4.527, 4.741	5.146	5.048, 5.244	2.876	2.748, 3.004	4.804	4.677, 4.931	3.197	3.068, 3.326
23.06.2020	4.442	4.334, 4.549	5.053	4.952, 5.154	2.823	2.692, 2.955	4.742	4.613, 4.871	3.060	2.935, 3.185
07.07.2020	4.497	4.386, 4.608	5.004	4.901, 5.107	2.601	2.472, 2.730	5.018	4.893, 5.143	2.746	2.625, 2.866

Note. M = mean; CI = 95% confidence intervals.

As can be seen in Table 1, a consistent decrease in virus-related health worries occurred in March and April—but not in May, June, and July (there was only one overlap in CIs [on June 09]). Hence, the decline in health worries seemed to have largely stopped by May. Thus, Hypothesis 1 is partially supported.

Contrary to our expectations, we did not observe any increases in worries about the economic consequences of the virus (see Table 1). Surprisingly, worries about a recession even seemed to be somewhat lower at the two most recent measurement occasions (June 23 and July 7) compared to the first four (March 24 to April 14). Furthermore, regarding worries about unemployment, the pattern of change was rather unsystematic and clearly not pointing towards any significant increase. Consequently, Hypothesis 2 is fully rejected.

In Hypothesis 3, we expected the acceptance of social distancing measures to gradually decrease over time. This was clearly supported by our data on the acceptance of stay-at-home orders, which strongly decreased from March to May and still seemed to be decreasing—albeit to a smaller extent—in June and July (see Table 1). With regard to the general acceptance of social distancing measures, we found a corresponding decrease in March and April, but the bottom of this trajectory seemed to have been reached in May and June. In fact, the observed value for general acceptance of social distancing measures on July 7 was the highest observed value since April 21. Taken together, both findings imply the partial confirmation of Hypothesis 3.

Table 2

Standardised effects on the acceptance of stay-at-home orders and 95% confidence intervals

Variable	Health worry		Worry about recession		Worry about becoming unemployed		Health worry * worry about recession (interaction)		Health worry * worry about becoming unemployed (interaction)	
Date	EST	CI	EST	CI	EST	CI	EST	CI	EST	CI
24.03.2020	0.213	0.152, 0.274	-0.085	-0.145, -0.024	0.087	0.024, 0.149	0.056	0.002, 0.109	0.041	-0.017, 0.098
31.03.2020	0.290	0.228, 0.351	0.008	-0.054, 0.069	0.015	-0.048, 0.078	0.079	0.024, 0.133	-0.026	-0.085, 0.033
07.04.2020	0.305	0.244, 0.366	0.022	-0.039, 0.084	-0.056	-0.119, 0.007	0.016	-0.039, 0.071	0.006	-0.053, 0.065
14.04.2020	0.234	0.173, 0.294	0.121	0.060, 0.182	-0.116	-0.178, -0.053	0.082	0.028, 0.136	0.046	-0.012, 0.105
21.04.2020	0.209	0.148, 0.271	0.006	-0.055, 0.067	-0.040	-0.102, 0.021	0.050	-0.004, 0.104	-0.017	-0.075, 0.042
28.04.2020	0.207	0.147, 0.267	0.058	-0.003, 0.119	-0.102	-0.164, -0.040	0.008	-0.046, 0.062	-0.013	-0.072, 0.045
05.05.2020	0.262	0.201, 0.324	0.100	0.038, 0.162	-0.068	-0.131, -0.004	0.051	-0.004, 0.107	-0.039	-0.099, 0.021
12.05.2020	0.264	0.203, 0.325	0.107	0.046, 0.168	-0.086	-0.149, -0.023	-0.011	-0.066, 0.044	-0.045	-0.105, 0.014
19.05.2020	0.319	0.256, 0.382	0.097	0.033, 0.161	-0.091	-0.155, -0.026	0.034	-0.023, 0.090	-0.010	-0.072, 0.052
26.05.2020	0.215	0.150, 0.279	0.117	0.053, 0.182	-0.057	-0.123, 0.010	0.017	-0.041, 0.076	-0.055	-0.118, 0.008
09.06.2020	0.229	0.166, 0.292	0.117	0.053, 0.181	-0.044	-0.107, 0.020	0.060	0.003, 0.116	-0.002	-0.064, 0.060
23.06.2020	0.175	0.113, 0.237	0.112	0.049, 0.176	-0.125	-0.188, -0.061	0.066	0.010, 0.121	-0.093	-0.154, -0.033
07.07.2020	0.220	0.158, 0.282	0.108	0.046, 0.171	-0.072	-0.136, -0.009	0.051	-0.005, 0.107	-0.062	-0.122, -0.002

Note. EST = estimated effect (standardised); CI = 95% confidence intervals; dependent variable = acceptance of stay-at-home orders.

Table 3

Standardised effects on the acceptance of social distancing measures in general and 95% confidence intervals

Variable	Health worry		Worry about recession		Worry about becoming unemployed		Health worry * worry about recession (interaction)		Health worry * worry about becoming unemployed (interaction)	
Date	EST	CI	EST	CI	EST	CI	EST	CI	EST	CI
24.03.2020	0.425	0.369, 0.481	-0.211	-0.266, -0.156	0.035	-0.023, 0.092	0.075	0.026, 0.124	0.061	0.008, 0.114
31.03.2020	0.437	0.381, 0.493	-0.149	-0.205, -0.092	-0.029	-0.087, 0.029	0.086	0.036, 0.136	0.051	-0.003, 0.105
07.04.2020	0.414	0.358, 0.47	-0.151	-0.207, -0.094	-0.056	-0.114, 0.002	0.015	-0.035, 0.065	0.026	-0.029, 0.080
14.04.2020	0.425	0.369, 0.481	-0.224	-0.28, -0.167	-0.071	-0.129, -0.014	0.095	0.046, 0.144	0.003	-0.051, 0.056
21.04.2020	0.447	0.390, 0.503	-0.140	-0.197, -0.084	-0.022	-0.078, 0.035	0.057	0.007, 0.106	-0.004	-0.058, 0.050
28.04.2020	0.440	0.384, 0.495	-0.187	-0.242, -0.131	-0.078	-0.135, -0.022	-0.022	-0.071, 0.027	0.046	-0.008, 0.099
05.05.2020	0.446	0.389, 0.502	-0.114	-0.171, -0.057	-0.092	-0.151, -0.034	0.016	-0.035, 0.067	-0.024	-0.079, 0.031
12.05.2020	0.423	0.367, 0.479	-0.202	-0.259, -0.146	-0.088	-0.145, -0.030	0.008	-0.043, 0.058	-0.050	-0.105, 0.005
19.05.2020	0.462	0.405, 0.520	-0.226	-0.284, -0.167	-0.040	-0.099, 0.019	-0.013	-0.064, 0.039	-0.087	-0.143, -0.030
26.05.2020	0.498	0.438, 0.557	-0.144	-0.204, -0.085	-0.086	-0.147, -0.024	-0.004	-0.058, 0.050	0.000	-0.058, 0.058
09.06.2020	0.418	0.36, 0.475	-0.129	-0.187, -0.070	-0.016	-0.074, 0.042	-0.042	-0.093, 0.010	-0.043	-0.099, 0.014
23.06.2020	0.442	0.385, 0.499	-0.147	-0.205, -0.089	-0.087	-0.145, -0.028	0.014	-0.037, 0.065	-0.080	-0.135, -0.024
07.07.2020	0.445	0.388, 0.502	-0.147	-0.205, -0.090	-0.112	-0.170, -0.054	0.028	-0.023, 0.079	-0.028	-0.083, 0.027

Note. EST = estimated effect (standardised); CI = 95% confidence intervals; dependent variable = acceptance of social distancing measures in general.

For the standardised model used to test Hypotheses 4 to 7, a likelihood ratio test showed that restricting covariances to be time-invariant significantly impaired model fit ($\Delta\chi^2 = 344.83$, $df = 132$, $p < .001$). Consequently, this restriction was discarded. Regarding our hypotheses on within-person relationships between worry and social distancing, the corresponding likelihood ratio test implied that regression coefficients differed significantly between measurement occasions ($\Delta\chi^2 = 253.35$, $df = 120$, $p < .001$). Therefore, Hypotheses 4 to 7 were subsequently tested based on the measurement occasion-specific regression coefficients given in Tables 2 and 3. More specifically, for each worry variable, 26 regression coefficients (effects across 13 measurement occasions on two social distancing measures) were inspected based on their CIs.

The inspection of standardised regression coefficients revealed that worries about the novel coronavirus consistently had significant positive effects on both types of acceptance measures (general acceptance and acceptance of stay-at-home orders; all standardised effect estimates significant and ranging from 0.175 to 0.498; see Tables 2 and 3). Hypothesis 4 is fully supported.

However, results regarding Hypothesis 5 were more ambiguous. While worries about employment had consistent negative effects on the general acceptance of social distancing measures (with all standardised effect estimates significant and ranging from -0.114 to -0.226, see Table 3), this was not true for the acceptance of stay-at-home orders. Instead, on this measure, significant positive effects were observed in 8 out of 13 measurement occasions (see Table 2). For worries about recession, most (23 out of 26) regression coefficient estimates were negative (see Tables 2 and 3)—however, only 14 of these estimates reached statistical significance, and even those that did so were generally very small (with only four of them larger than 0.100). Thus, we deem Hypothesis 5 to be only partially confirmed.

Finally, as can be seen in Tables 2 and 3, interaction effects between health and economic worries were very small (all absolute values of interaction effect estimates in the standardised model were below 0.10), and also differed regarding their directions. More specifically, 14 out of 52 regression coefficients were significant, with 10 indicating a positive interaction between worry variables and 4 pointing towards a negative interaction. Moreover, no consistent significant changes in their magnitude over time were found, which is why we conclude that neither Hypothesis 6 nor Hypothesis 7 is supported by our data.

Discussion

The present study investigated the interplay between health worries and economic worries on the acceptance of social distancing measures during the beginning of the SARS-COV-2 outbreak in Germany. To do so, we re-analysed data from the German COSMO survey (Betsch et al., 2020a), a recurring monitoring survey on psychological and behavioural aspects associated with the pandemic.

In line with our expectations, results showed that virus-related health worries gradually decreased from March to April 2020. This finding is in line with established psychological theories (e.g., Tversky & Kahneman, 1973), as fading novelty and media coverage on the virus itself may lead to a reduction in the perceived dangerousness of the disease. Another potential explanation for this result is that, over this period, it became increasingly clear that at-risk groups (e.g., individuals with pre-existing conditions and higher age) are more prone to severe COVID-19 illness, whereas young and healthy persons often only experience mild symptoms (e.g., Zhou et al., 2020). Considering that a large proportion of our sample did not belong to at-risk groups, our findings on decreasing health worries might thus not only reflect decreased novelty, but might also be related to growing knowledge on the disease itself. In contrast to our expectations, however, the decrease in

health worries ended at the beginning of May 2020, resulting in a rather constant level of health worries from May to July. Psychological phenomena such as the availability heuristic (e.g., Tversky & Kahneman, 1973), might thus have played a stronger role in the beginning of the pandemic, and health worries might correspondingly have diminished earlier than expected.

Moreover, we observed a linear and rather steep decline in the acceptance of stay-at-home orders over the entire observation period, and found that an increasingly large proportion of participants indicated that the current measures were exaggerated—at least until the end of April 2020. This could be explained by the easing of social distancing measures from mid-April onwards (Steinmetz et al., 2020), and indicates that our data on the measures being exaggerated underestimate the decrease in the acceptance of social distancing over time—a potential explanation for the effects fading out beginning with May 2020. Nevertheless, these findings show that the acceptance of social distancing diminished over time. This further underlines the importance of investigating potential predictors of the acceptance of social distancing—as we did in Hypotheses 4 to 7.

Regarding Hypothesis 4, our data revealed significant effects of health worries on the acceptance of social distancing measures. More specifically, individuals with higher health worries reported more acceptance of social distancing measures and vice versa, which is again in line with current research on COVID-19 (e.g., Harper et al., 2020). Of note is that the corresponding effects were stronger for the more general item on the measures being exaggerated compared to the acceptance of stay-at-home orders. This may be because individuals had realised that stay-at-home orders were only one way to deal with the pandemic, and that alternative measures such as the compulsory use of masks may also be effective. Moreover—even though we concede that this interpretation is somewhat

speculative—it may indicate that trust in how the government generally deals with the pandemic depends, among others, on health worries.

An unexpected result, however, was the consistency of the level of economic worries across time, with worries about becoming unemployed remaining rather constant, and worries about a recession even slightly decreasing over the last two waves. This may be because of the vigorous government interventions in Germany, such as furloughs, unlimited loans to companies, and changes in bankruptcy legislation. These interventions, which were received very positively in Germany, might have achieved two goals: Alleviating the economic and societal impact of the pandemic, and preventing an increase in individual economic worries. This might also explain why the relationship between economic worries and the acceptance of social distancing was less consistent than expected, and why we found no interactions between health and economic worries on the acceptance of social distancing. In fact, we had initially expected that high economic worries combined with low health worries would lead to maximum rejection of social distancing as individuals consider the imposed measures to be unnecessary. However, individuals with high economic worries who nevertheless see that the government is doing quite well in alleviating the negative consequences of social distancing might well conceive the government's actions as more reasonable overall, thereby also reducing their views of social distancing measures as unnecessary. This, in turn, might lead to a situation where health worries and economic worries are rather independent in their effects on the acceptance of social distancing, thus explaining the absence of corresponding interactions.

Another explanation for these unexpected results is directly related to our measurement of economic worries. In fact, worrying about unemployment strongly depends on the economy sector in question, and individuals who had already become unemployed may have had trouble responding to the corresponding item (even though the item includes an

"if applicable" notion). Moreover, Germany has been experiencing a recession for some time now, which is why asking participants if they worry that a recession *might* occur is problematic, too. Notwithstanding these methodological issues, economists predict a sharp increase in bankruptcies for Autumn 2020 due to adaptations in the German bankruptcy legislation (Creditreform, 2020), a situation that could lead to an increase in the salience of economic damage (and thus economic worries). For this reason, and because our current results do not allow a clear conclusion on the effects of economic worries yet, we plan to re-test Hypotheses 2 and 5-7 at the beginning of Winter 2020.

As for practical implications, it is important to note that in a democratic state, behavioural infection control measures only work to the extent that people adhere to them. Our study illustrates that individual differences in the perception of the pandemic and its consequences play an important role in the German public's acceptance of social distancing, and we expect that this also generalizes to an international level. Since these perceptions are shaped by the corresponding media coverage, we see it as imperative that research results on the pandemic are disseminated to a wider audience. This particularly applies to well-established findings such as those on the efficacy of wearing face masks or to modelling studies that illustrate how far the virus would spread without social distancing. Since the beginning of the pandemic, several virologists and epidemiologists have done so in an exemplary manner, and we sincerely hope that they continue with these efforts for the duration of this global health crisis.

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