

# COVID-19 and Gender Differences in Social Trust: Causal Evidence from the First Wave of the Pandemic

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## Abstract

Although research provides causal evidence on the effects of COVID-19 lockdown measures on trust, causal effects of infection risks are missing. To contribute to increasing research on the societal consequences of the COVID-19 pandemic, we estimate whether high incidence rates net of lockdown measures induce causal changes in social trust. We use representative household panel data from Germany and employ a difference-in-difference design. Although social trust increased during the first phase of the pandemic, the difference-in-difference analysis reveals that high incidences have a negative effect on social trust. We show that females drive this effect. The negative effect is especially large among highly educated women and women with poor pre-COVID-19 health. Overall, our results suggest that increasing incidences signal noncompliance of unknown others. Consequently, the overall positive trend might reverse in the medium and long run, leading to declines in social cohesion over the course of the pandemic.

## Keywords

COVID-19, difference-in-difference, household panel data, gender, interpersonal trust

In the past two years, an increasing body of research on the nonmedical consequences of the COVID-19 pandemic has emerged. In this vein, research started investigating the impact of the pandemic on social cohesion. Although research commonly finds increases in social trust during and after natural disasters (e.g., Calo-Blanco et al. 2017; Toya and Skidmore 2014), research on COVID-19 delivers a mixed picture. Thus far, COVID-19 research indicates that trust has decreased in the Netherlands (e.g., Iacono et al. 2021), the UK (e.g., Borowska and Laurence 2021), Italy, and Spain (e.g., Daniele et al. 2020), whereas evidence from Norway and Germany suggests the stability of trust (e.g., Delhey et al. 2021; Thoresen et al. 2021). In contrast, trust has increased during the initial phase of the COVID-19 pandemic in Sweden and South Korea (e.g., Esaiasson et al. 2020; Kye & Hwang 2020).

Whereas cultural and political differences may be major reasons for the mixed evidence, methodological issues could also play a role. Thus far, research on the COVID-19 pandemic's effects on social trust, in contrast to research on political trust (e.g., Groeninger et al. 2021), mainly relies on convenience samples, experimental data, or pre- and post-comparisons. Because findings based on such data designs can only identify local average treatment effects (e.g., time trends not attributed to the COVID-19 pandemic cannot be

accounted for), the current state of research suffers from problems of generalizability. Furthermore, current empirical approaches often cannot identify the causal mechanism (e.g., policy measures or incidence rates) leading to trust changes.

We overcome this shortcoming of previous work and investigate changes in trust based on representative household panel data from Germany (Panel Labor Market and Social Security; PASS), which we enrich with administrative data on incidence rates on the district level (Robert Koch Institute [RKI] 2021). Based on these data, we employ a difference-in-difference (DiD) design that uses the timing of interview responses (i.e., interviews before and after the first societal lockdown) and high incidence rates (i.e., above the median) on the district level in 2020 as treatment indicators. Such an approach cancels out lockdown policy measures and isolates the causal effect of high incidences on trust changes.

We argue that cancelling out policy effects is important because trust in fellow citizens might be particularly affected

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when incidence rates increase given strict distancing measures. According to prior research, mistrust that unknown others do not adhere to distancing policies might constitute a crucial social mechanism leading to trust changes (Iacono et al. 2021). We argue that high incidence rates provide signals that influence individuals' perceived norm compliance. Thus, if incidence levels rise, perceived norm compliance should decline, which might decrease social trust. Incidence rates might be particularly important because individuals may directly infer potential cases of visible norm violations through these numbers. Such a process could in particular lead to strong decreases in social trust among individuals with higher levels of compliance (i.e., personal normative beliefs in the purpose of health-protecting behavior) and perceived norm compliance (i.e., among individuals who think many other fellow citizens adhere to containment measures; Rauhut 2013). Thus, we overall expect trust to be negatively affected by high incidence rates.

The pandemic's effects on social trust are likely heterogeneous because the COVID-19 pandemic has no uniform effect on members of societies. Despite individuals' age, which structures hospitalization and mortality risks (e.g., Carrillo-Vega et al. 2020), research on the initial phase of the COVID-19 pandemic indicates pronounced increases in infection risks for low-educated and individuals from low-income households (Hoebel et al. 2022). The main social mechanisms may constitute the possibility for individuals from high-income households and for highly educated individuals to work from home (Hoenig and Wenz 2021; Schröder et al. 2020). The possibility of remote work might also explain why essential workers such as health care and social workers exhibit higher risks for COVID-19 infections (Mutambudzi et al. 2020). Occupational segregation might also explain higher infection, hospitalization, and mortality risks for individuals with migration backgrounds (e.g., Gustafsson et al. 2022). Additionally, evidence from a substantive meta-analysis suggests that preexisting conditions or chronic diseases (e.g., hypertension, obesity, cerebrovascular disease) increase the likelihood of severe disease processes, hospitalization, and death (Geng et al. 2021).

Additionally, research indicates gender differences in the initial phase of the COVID-19 pandemic. Research suggests that females have higher COVID-19 infection risks, which might be explained by occupational segregation in labor markets (Connor et al. 2020). Labor market research from Germany (Möhrling, Reifenscheid, and Weiland 2021) suggests that women have been more likely to work on site and had higher risks of job losses during the initial phase of the COVID-19 pandemic. At the same time, women in Germany were far more likely to overtake care responsibilities during school and institutional child care closures (Zoch, Bächmann, and Vicari 2021b). In addition, research indicates that women (and in particular mothers) have experienced the strongest well-being declines in the first wave of the COVID-19 pandemic. Interestingly, while declines are

not heavily driven by labor market processes or caregiving, general societal worries (i.e., about the education system, health care system, labor market, economy, and social inequality), which may have been amplified through the outbreak of the COVID-19 pandemic, appear to be important for women's well-being (e.g., Zoch et al. 2021a)—a finding potentially highly relevant for social trust. In general, research on the initial phase of the COVID-19 pandemic indicates a gendered pandemic effect on individuals' lives, and the interesting question emerges whether gender differences in social trust also appear.

Findings on COVID-19 and well-being are potentially important for trust research because earlier work suggests a correlation between social trust and well-being (Helliwell and Putnam 2004). Given that women's well-being declined in the first phase of the COVID-19 pandemic in Germany in particular, we may also expect social trust to decrease. Furthermore, research indicates that women are especially supportive and compliant with measures combating the spread of the disease (e.g., Galasso et al. 2020). Because we stated previously that mismatches between personal normative beliefs and perceived norm compliance might introduce distrust (Rauhut 2013), we may expect a stronger reaction of women to high incidence rates, which may signal norm violation.

In a broader sense, studying the COVID-19 pandemic's effect on social cohesion is important because social trust is crucial for the support of public (e.g., Fairbrother 2016) and redistribution policies (e.g., Habibov, Cheung, and Auchynnikaeva 2017), for physician–patient interactions (e.g., Arakelyan et al. 2021; Cherif, Bezaz, and Mzoughi 2021; Petrocchi et al. 2019), and for COVID-19 vaccination uptake (e.g., Đorđević et al. 2021). Thus, employing our causal design to scrutinize changes in trust helps to gauge the potential long-term consequences of the COVID-19 pandemic. Moreover, in employing our causal identification strategy and investigating effect heterogeneity, we contribute to the understanding of potential polarization across social groups within highly affected regions during the initial phase of the COVID-19 pandemic.

## Data and Methods

### Data

We use data from the Panel Labour Market and Social Security (Trappmann et al. 2019). The PASS is a large-scale panel study of German households that has been surveying approximately 10,000 households with approximately 15,000 individuals since 2006. The PASS consists of a representative general population sample and a welfare benefit recipient sample, thus allowing for investigating even fine-grained heterogeneities due to the large statistical power. With regard to panel attrition and refreshment samples, the number of individual interviews in 2020 is 10,210. Overall,

response rates in the survey are relatively high, approximately 30 percent (Trappmann et al. 2019). The German Institute for Employment Research (IAB) conducts this annual survey.<sup>1</sup> To ensure high data quality, interviewers for the survey receive between 6 and 8 hours of training per wave, and the IAB continuously monitors the survey progress during the field time. The PASS has been used extensively in social science research (see: <https://www.iab.de/en/publikationen/publikationen-nach-projekten.aspx/Projekt/k060821f35>), which shows high data quality.

Two main reasons make the PASS data set an ideal source for the evaluation of the effects of the COVID-19 pandemic. First, the data allow researchers to investigate pre-COVID trends. Second, because the data collection for the 2020 survey wave started in February 2020, it is possible to compare responses both prior to and after the outbreak of the pandemic within the survey year 2020. Our analytical strategy will exploit this key feature of the data.

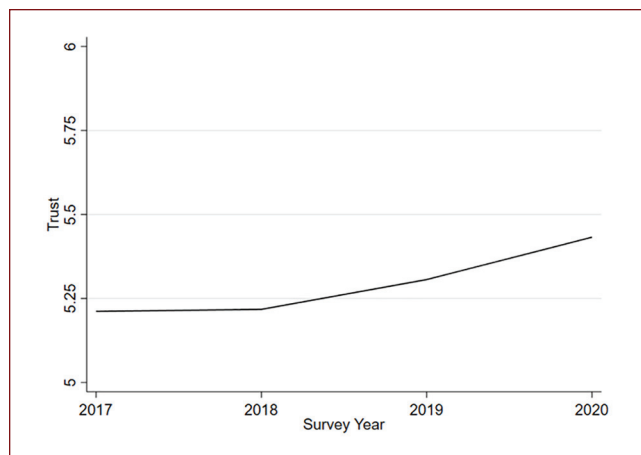
Because we are interested in the effect of incidence rates on social trust, we further enrich the individual-level data with data on incidence rates at the district level. These data stem from the Robert Koch Institute, which has been providing incidence data since the spring of 2020 (RKI 2021). We merge these administrative data to the individual-level data based on the district-level information provided by PASS respondents.

Our employed data set comprises the key lockdown events in Germany and the entire first wave of the spread of the coronavirus. In Germany, on March 10, 2020, the federal government suggested cancelling large events, and on March 13, 2020, the German state governments announced school closures. On March 22, 2020, the first German-wide lockdown started. The entire duration of the first lockdown was seven weeks. After that initial nationwide lockdown, German federal states implemented different reopening strategies. The first peak of the coronavirus spread (approximately 6,000 cases a day) in Germany was the end of March/beginning of April (Dong, Du, and Gardner 2020).

## Measures

**Social trust.** The PASS surveys our main dependent variable with the “standard” social trust measure (“Speaking very generally, would you say that you can trust most people, or can you never be too careful when dealing with other people?”) on a scale from 0 (low) to 10 (high). This variable is available from 2017 onward. Figure 1 shows the development of average trust in our data over time. The average is relatively stable at approximately 5.2 points on the scale and increases slightly over time.

<sup>1</sup>Data access to the Scientific Use File (SUF) is provided by the Research Data Centre of the German Federal Employment Agency at the IAB. The SUF for Wave 14 was released in November 2021 (Berg et al. 2021).



**Figure 1.** Average trust over time.

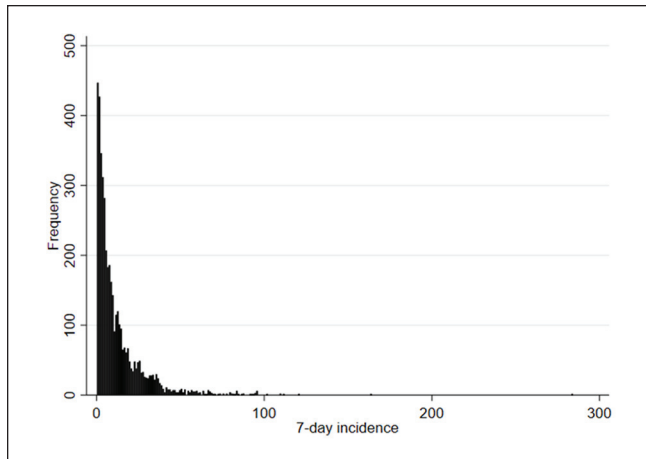
Source: Panel Labor Market and Social Security data Waves 11 to 14.

Note: Social trust ranges from 0 to 10.

**Treatment group (incidence rates).** Our main independent variable of interest is the regional incidence of COVID-19 at the date of the interview, measured as the rolling average of new cases per 100,000 inhabitants on the district level. These numbers have been reported in German media since the beginning of March 2020. We use the rolling average of new cases per 100,000 inhabitants to create a binary indicator variable that determines treatment status. In the postperiod and dependent on the day of the interview, we use individuals in districts with above-median incidences in the data as the treatment group and individuals in districts with equal to or below-median incidences at the time of the interview as the control group. The central assumption behind this treatment indicator is that above-average incidences at the time of the interview signal norm noncompliance, whereas below-average incidence rates signal norm compliance.

During this period, 37 percent of all interviews took place at times and in districts with an incidence of 0. The average incidence rate was 7.6. Figure 2 shows the distribution of incidences after March 23, 2020, excluding zeroes. As seen, there is substantial variation. Furthermore, keep in mind that these data are collected at a time when testing capacity was limited; the true incidences might thus be substantially higher. However, these data should still be sufficient to separate districts with a relatively low prevalence of COVID-19 from districts with a high prevalence.

**Heterogeneous effects.** Furthermore, we investigate effect heterogeneities along the lines of gender, migration background, age, needs-adjusted household income, and education (measured as possessing a vocational degree, a university degree, or neither). Furthermore, we investigated treatment effects by pre-COVID-19 (in 2019) self-assessed physical and mental health (both are measured on a 5-point scale from “poor” to “very good”; we dichotomized both scales comparing “very good” and “good” to the three lower



**Figure 2.** Seven-day COVID incidence rate per 100,000 inhabitants at the district level.

categories) and essential worker status. We consider individuals in care occupations, the educational system, and health care workers as essential workers in this analysis. Appendix Table A1 shows the sample descriptives separately by interview timing and year. In the analysis, the number of cases may differ by subgroup because not all respondents necessarily answered all survey items (e.g., household income). However, we decided not to delete those cases due to power issues.

### Statistical Analysis

We rely on a difference-in-difference identification strategy to estimate the causal effect of the COVID-19 incidence on social trust. We estimate the following model:

$$trust_{it} = \beta_0 + \beta_1 post_t + \beta_2 treat_i + \lambda treat_i \cdot post_t + X'_{it} + \epsilon_{it},$$

where *trust* is one's self-assessed social trust; *post* is an indicator variable that is assigned the value 1 from March 23, 2020, onward (the day the nation-wide lockdown began)<sup>2</sup>; *treat* is the previously described treatment indicator; and *X* is a set of control variables, namely, interview mode, interview month, and district (German *Kreise*) fixed effects. In particular, the inclusion of district fixed effects is important because comparing social trust across treatment and control groups within the same districts cancels out the effect of the COVID-19 policy measures on social trust (i.e., such policy affect all individuals from the same district in the same way).

The DiD approach allows us to investigate how individuals' social trust would have changed if they were not affected by high COVID-19 incidence rates. Thus, the main outcome

of interest would be the within-person change in social trust in a state with and without high COVID-19 incidence rates. However, one observed individual cannot be in two different states (i.e., in a district with high incidence rates and a district with low incidence rates) at the same time. Our proposed DiD approach that assigns individuals to treatment and control groups allows implementing a potential outcome framework (Morgan and Winship 2015) and therefore identifying the effect of incidence rates on social trust.

In our analytical approach, we first provide trends in social trust between the treatment and control groups over time. Second, we present the results from the DiD analysis. In this workaround, we show the main effect of high incidence rates and results from separate DiD models for different subgroups introduced in the previous section. Third, we repeat this workaround and show the results for males and females separately.

## Results

### Trends in Social Trust Over Time

We begin by investigating differential trends in social trust. Figure 3 provides trends in trust for the treatment (districts with an above-average incidence in 2020) and control groups (districts with a lower incidence). Panel a depicts trends for the years before the nationwide lockdown on March 22 started conditioned on survey responses from February to mid-March. Panel b depicts trends before and during the pandemic conditioned on survey responses from mid-March to May. As seen, trust remains relatively constant for both groups in Panel a. Although there is some noise, the trends develop in parallel in Panel a of Figure 3, and therefore the central DiD assumption (i.e., trust would have developed in parallel trends over time between districts with high and low incidences in the absence of treatment) to identify the causal effect holds.

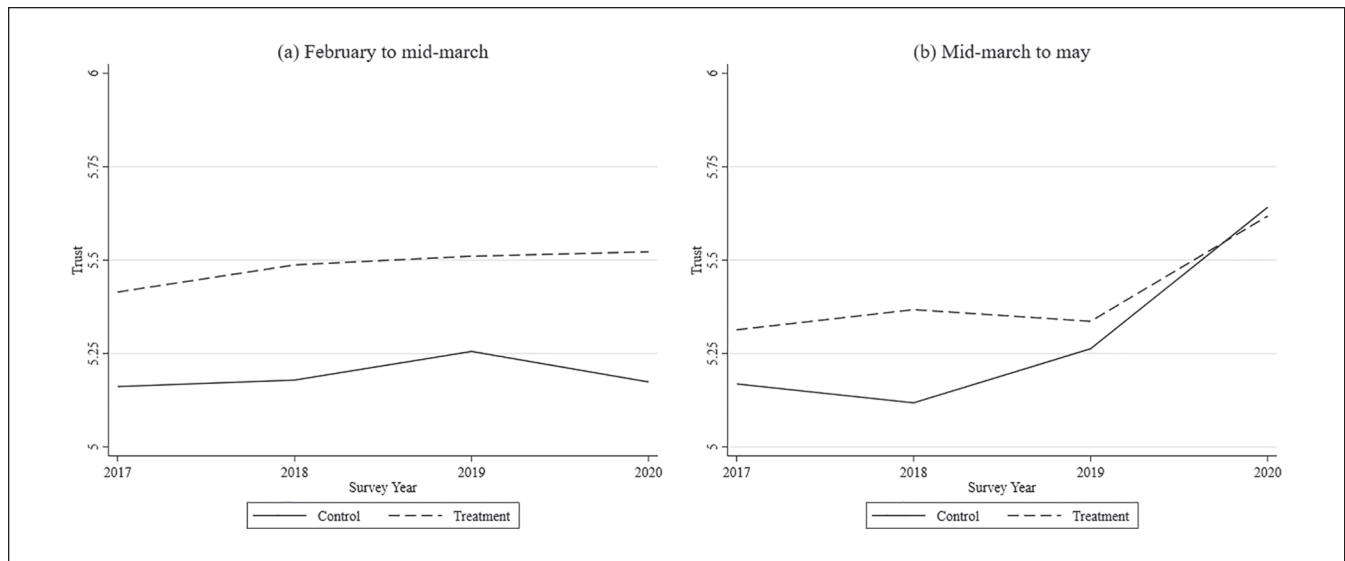
In contrast, after the time of the lockdown, trust increases in 2020 in both groups in Figure 3, Panel b, but to a far larger magnitude in the control group. This suggests that indeed the incidence could have affected social trust.

### The Main Effect of High Incidence Rates and Its Heterogeneities

The main estimate of our DiD analyses (first row of Table 1) that use the years 2019 and 2020 and the months of February to May (this procedure ensures that the other time-related factors do not affect our results) indicates a statistically significant negative treatment effect, thereby supporting the descriptive analysis in Figure 3. Thus, high incidence rates have a negative causal effect on social trust.

The lower panels of Table 1 present the heterogeneities of the treatment effect in showing predicted differences between treatment and control groups for the subgroups of

<sup>2</sup>In a robustness check, we also shift the cutoff date one week earlier to ensure that our results are not biased by anticipation effects.



**Figure 3.** Social trust over time by treatment status and interview timing.

Source: Panel Labor Market and Social Security data Waves 11 to 14.

Note: Social trust ranges from 0 to 10.

interest. We first begin by investigating gender differences in Panel A. As shown, the effect is statistically insignificant and close to zero in magnitude for men but approximately  $-.3$  and significant for women. Thus, the overall effect in the sample is largely driven by women. We now turn to heterogeneities by education in Panel B. The results indicate that the effect is largely driven by highly educated individuals, whereas the effect is smaller in magnitude and not significantly different from zero for individuals with a vocational degree or neither a vocational nor a university degree.

Surprisingly, in Panels C to H, we find only a few significant differences by household income, age, region, health, occupation, or migration status. Regarding age, only individuals younger than 60 show significant (on the 10 percent level) treatment effects. However, the effect does not substantially differ in magnitude from older individuals, and the effects might also be driven by sample size. Furthermore, the treatment effect is only significant for natives, but the small sample size could also simply lead to insignificant effects in the migrant sample.

In Panel I in Table 1, we show several robustness checks to assess the sensitivity of our main results. We add control variables (gender, age, and education), shift the treatment date one week forward when school closures were announced, and do not restrict the survey period from February to May and use years 2017 onward. All of these checks show the robustness of our results. Furthermore, we estimate a placebo treatment using only the years 2017 and 2018 and perform the analysis as if the treatment happened in 2018. Reassuringly, the placebo effect is not significant. Last, we

estimate the effects of districts with an incidence of 0 versus the upper quartile of incidences to show that our median cut-off does not randomly lead to effects. Again, we confirm our baseline results. Overall, the effects are robust to a number of checks.

### Gender Differences in the Social Gradient

In the previous section, we have shown that the effect of incidence rates on trust is especially driven by women and highly educated individuals. Thus, we now dive further into heterogeneities in the social gradient of the effect by gender in Table 2. Strikingly, we found no significant treatment effect for males in any subgroup. This indicates that the treatment effect is driven entirely by women.

When investigating heterogeneities (i.e., analyzing predicted differences between treatment and control groups for the subgroups of interest) for women, we find an educational gradient: highly educated women are the group with the largest negative effect (Table 2, Panel A), followed by women with average or poor pre-COVID-19 physical health (Table 2, Panel D). Overall, the results show that women are far more reactive to incidence rates than men.

### Conclusion and Discussion

Based on representative household panel data for Germany and DiD estimations, we investigated the causal effect of COVID-19 incidence rates on generalized social trust. Overall, we found that—as in other countries—generalized social trust increased in 2020 (e.g., Esaiasson et al. 2020;

**Table 1.** Results from Difference-in-Difference Estimations: Main Effect and Social Gradient.

	DiD Coefficient	SE	N
Main treatment effect	-.162*	(.080)	15,633
(A) By gender			
Males	-.030	(.112)	7,734
Females	-.320**	(.116)	7,899
(B) By education			
No vocational or university degree	.080	(.227)	3,396
Vocational degree	-.087	(.106)	8,658
University degree	-.313*	(.132)	3,149
(C) By household income			
Below or equal to median	-.051	(.139)	7,801
Above median	-.076	(.096)	7,654
(D) By age			
< 60	-.181 +	(.097)	10,647
≥ 60	-.103	(.143)	4,986
(E) By health (2019)			
Physical health			
Poor or average	-.159	(.107)	8,620
Good	-.023	(.127)	6,129
Mental health			
Poor or average	-.079	(.147)	5,184
Good	-.061	(.098)	9,565
(F) By region			
East Germany	-.164	(.148)	4,349
West Germany	-.170 +	(.095)	11,284
(G) By migration status			
Migration background	-.068	(.169)	4,475
Natives	-.176 +	(.093)	10,785
(H) Essential workers			
Essential workers	-.222	(.249)	1,164
Nonessential workers	-.150 +	(.084)	14,469
(I) Robustness			
Adding controls <sup>a</sup>	-.137 +	(.079)	15,203
Treatment date: March 16	-.161 *	(.078)	15,633
Whole survey period <sup>b</sup>	-.155**	(.058)	22,073
2017–2020	-.189**	(.073)	35,017
Placebo 2018 (vs. 2017)	.088	(.055)	19,384
0 incidence vs. upper quartile	-.166 +	(.086)	15,504

Source: PASS data waves 11 to 14.

Note: Main specification controls: interview mode, interview month, district fixed effects. DiD = difference-in-difference.

<sup>a</sup>Additional controls: gender, age, education.

<sup>b</sup>Analysis in the main specification restricts survey months to February through May. The entire survey period, however, includes interviews until September.

+ $p < .10$ , \* $p < .05$ , \*\* $p < .01$  (two-tailed test for significant difference from 0).

Kye & Hwang 2020). However, our DiD estimation results revealed that this effect is dampened if incidence rates are high. Furthermore, we showed that the effect is entirely driven by women. Among women, we found that the effect is especially prevalent for the groups of highly educated and those with poor pre-COVID health. Thus, our results indicate

polarization within regions by gender. Furthermore, even among women, there appears to be a more nuanced pattern of polarization.

The pronounced gender differences could be explained by different weights of the importance of beliefs in the subsequent containment measures. Galasso et al. (2020) show

**Table 2.** Results from Difference-in-Difference Estimations by Gender.

	Males			Females		
	DiD Coefficient	SE	N	DiD Coefficient	SE	N
Main treatment effect	-.030	(.112)	7734	-.320**	(.116)	7,899
(A) By education						
No vocational or university degree	-.085	(.316)	1712	.028	(.327)	1,684
Vocational degree	-.046	(.151)	4118	-.246+	(.149)	4,540
University degree	-.034	(.187)	1690	-.577**	(.203)	1,459
(B) By household income						
Below or equal to median	.091	(.192)	3878	-.248	(.202)	3,929
Above median	.038	(.140)	3762	-.155	(.138)	3,892
(C) By age						
< 60	-.092	(.138)	5300	-.301*	(.140)	5,347
≥ 60	.139	(.196)	2434	-.357+	(.212)	2,552
(D) By health (2019)						
Physical health						
Poor or average	.068	(.153)	4003	-.405**	(.153)	4,617
Good	-.013	(.173)	2361	-.024	(.188)	2,868
Mental health						
Poor or average	.007	(.230)	2133	-.259	(.194)	3,051
Good	.096	(.134)	5131	-.190	(.148)	4,434
(E) By migration status						
Migration background	.043	(.236)	2319	-.175	(.253)	2,156
Natives	-.056	(.131)	5229	-.340*	(.134)	5,556
(F) Essential workers						
Essential workers	.242	(.483)	310	-.320	(.298)	854
Nonessential workers	-.034	(.116)	7424	-.298*	(.126)	7,045

Source: Panel Labor Market and Social Security data Waves 13 to 14.

Note: Main specification controls: interview mode, interview month, district fixed effects. DiD = difference-in-difference.

+ $p < .10$ , \* $p < .05$ , \*\* $p < .01$  (two-tailed test for significant difference from 0).

that women perceive COVID-19 as a higher threat than men do and are more likely to agree and comply with containment measures. If incidence rates are high despite measures, this could dampen social trust among individuals who strongly adhere to social norms for COVID containment because high incidence rates signal a high degree of non-compliance, leading to a reduction in social trust (Rauhut 2013). As a consequence, social trust could erode in the long term as well. This could especially be the case when the magnitude of perceived noncompliance in society is large (e.g., signaled through steeply increasing regional incidence rates). With regard to policy implications, reduced levels of trust could harm a society's cohesion and, for example, also lead to more noncompliance in other areas of life, such as tax payments.

However, it could also be the case that social trust between men and women converges again if, for example, the risk assessment over time (through vaccinations or milder variants) changes and is again more in line with the observed norm compliance on the macro level. Thus, it is an open question how the pandemic affects group differences in social trust in the long run.

Further studies should investigate social trust changes during the COVID-19 pandemic because trust constitutes a central determinant for policy support and health behaviors. In the long run, changes in social trust may be an important channel for health inequalities within societies and should therefore be addressed to overcome potential adverse long-term health consequences of the COVID-19 pandemic.

**Table A1.** Sample Description.

	(1)		(2)		(3)		(4)	
	2017-2019				2020			
	February to Mid-March		Mid-March to May		February to Mid-March		Mid-March to May	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Generalized trust (0–10)	5.24	2.22	5.22	2.26	5.30	2.25	5.33	2.24
Female (0/1)	.51	.50	.50	.50	.50	.50	.50	.50
Age	46.41	16.95	43.90	16.61	47.52	16.94	46.54	16.64
Migration background	.32	.47	.38	.48	.34	.48	.38	.49
No vocational or university degree	.25	.43	.28	.45	.25	.43	.26	.44
Vocational degree	.56	.50	.53	.50	.54	.50	.51	.50
University degree	.19	.39	.19	.39	.21	.41	.23	.42
Needs-adjusted household income	1,498.88	1,320.97	1,476.19	1,247.91	1,550.79	1,003.58	1,561.23	958.10
Poor or average physical health (0/1)	.57	.49	.54	.50	.58	.49	.56	.50
Poor or average mental health (0/1)	.35	.48	.34	.47	.35	.48	.35	.48
Essential worker (0/1)	.07	.26	.07	.26	.07	.26	.08	.27
East Germany (0/1)	.26	.44	.24	.43	.26	.44	.24	.43


Source: Panel Labor Market and Social Security data Waves 11 to 14.

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