




Brief Report

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Age, Gender, and Disease as Determinants of Social Distancing: Germany as a Case Study

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Abstract

A mix of guidance and mandated regulations during the coronavirus disease (COVID-19) pandemic served to reduce the number of social contacts, to ensure distancing in public spaces, and to maintain the isolation of infected individuals. Individual variation in compliance to social distancing in Germany, relating to age, gender, or the presence of pre-existing health conditions, was examined using results from a total of 39 375 respondents to a web-based behavioral survey.

Older people and females were more willing to engage in social distancing. Those with chronic conditions showed overall higher levels of compliance, but those with cystic fibrosis, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), and epilepsy showed less adherence to general social distancing measures but were significantly more likely to isolate in their homes. Behavioral differences partly lie in the nature of each condition, especially with those conditions likely to be exacerbated by COVID-19. Compliance differences for age and gender are largely in line with previous studies.

During 2020 and 2021, the German health system was dominated by the struggle against the pandemic, commonly referred to as the *COVID-19 virus*. As an integral part of efforts to halt the spread of the virus, populations around the world were required to limit their usual mobility. In Germany, the Parliament (Bundestag) declared the situation to be an “epidemic situation of national significance” on March 25, 2020. This was followed by an extended lockdown, with economic restrictions. Social distancing regulations were introduced, which included restricting the number of contacts, self-isolating in the event of infection, and the wearing of face masks.

Generally, it is well known that the extent that individuals follow the law, adhere to health guidance, and demonstrate risk aversion depends on a number of well-known factors, including age, gender, and chronic disease. For example, females and older people are more likely to seek health advice,¹ and people with chronic non-communicable diseases, such as type 2 diabetes, exhibit a more risk averse behavior than the general population.² A multinational study found that those of greater age follow guidelines more strictly, with the exception of adherence to isolation,³ and a survey in 8 countries across 3 continents determined that females were more likely than males to perceive the pandemic as a more serious threat.⁴

A key risk factor predisposing to more severe illness in the event of a COVID-19 infection is the presence of other health care conditions. Such individuals are more likely to socially distance, but this applies only for individuals with certain conditions.⁵ Those conditions affecting the circulatory, cellular, and respiratory systems were associated with poor prognosis in the event of a COVID-19 infection.⁶

Cognitive and mental health conditions had little effect. Viral infection appeared to have little effect or even appeared to lead a certain level of protection against COVID-19-related symptoms. It remains unclear whether this is due to the infection with a virus itself or a result of medication taken by the patient.

The German Government’s official response was coordinated at the federal and regional levels. Most states mandated face mask wearing in public areas from April 27, 2020,⁷ followed by an extended lockdown period where a wide section of the economy was closed.⁸ Several further social distancing measures were introduced, aimed at reducing the overall number of social contacts. These included requiring that infected people self-isolate and mandating the wearing of face masks in public spaces. Face masks were mandatory and gatherings of more than 100 people were prohibited from late April 2020, whereas home working requirements varied.

To what extent do social factors determine the degree of social distancing? By analyzing the outcome of an international self-reported behavioral tracker for Germany, variations based on the socio-economic variables and pre-existing health problems are examined. The hypotheses were: (1) People of a higher age follow restrictions more frequently than younger individuals,

(2) there is a difference between genders in adherence to restrictions, and (3) pre-existing chronic diseases lead to more stringent obedience.

Data and Methods

Throughout the COVID-19 pandemic, regular surveying of public attitudes has been conducted and made available online on the “Imperial behavioral tracker.”⁹ The project uses the Yougov sampling methodology, with panels being used to generate a nationally representative sample on a regular, often weekly, basis for a number of countries globally. Participants report their behavior by responding to a set of questions through an online interface. Twenty questions relevant to “social distancing” were analyzed, and respondents answered on a 5-point Likert scale (1 = “not at all” to 5 = “always”). Pooled cross-sectional data for Germany were downloaded and examined for the dates from April 2, 2020, to August 30, 2021. The questions are asked in English and not validated with the local languages.

Age

For each question, the Spearman rank correlation between age and response level was calculated.

Gender

Differences in the mean response level, indicating compliance, were compared between male and female respondents for every question.

Health

Pre-existing health care complaints may indicate chronic illness and can influence a willingness to comply with social distancing measures. In order to establish which of the social predictors has the strongest influence, a multiple regression model was set up with adherence (1–5 Likert scale) as the dependent variable and age, gender, and pre-existing health condition as the independent variables:

$$C_i = \alpha + \beta_g D_g + \sum_{i=1}^{13} \beta_i D_i + \beta_a * age + \varepsilon_i$$

C_i : compliance to question i

D_g gender dummy: 1 for female, 0 for male

D_j health dummy: 1 for person having disease, 0 if not for 13 conditions

ε_i residual

A significantly positive coefficient with higher values would mean the factor is associated with a higher compliance.

Results

Data on 39 375 participants were examined, covering 39 rounds of surveying between April 2, 2020, and August 30, 2021. Basic descriptive statistics are provided in [Table 1](#). The mean age was 51 years with an interquartile range (IQR) of 36–62 years. In total, 48.2% of the respondents were male and 51.8% were female.

Table 1. Age and gender distributions for each disease group

Condition	Mean age	Share males	Prevalence (%)	Total sample
Arthritis	59.4	0.38	5.6	2133
Asthma	49.8	0.40	9.1	3379
Cancer	59	0.51	4.2	1631
Cystic fibrosis	31.2	0.61	0.4	174
COPD	58.4	0.53	4.7	1786
Diabetes	60.6	0.61	10.9	4093
Epilepsy	46.3	0.46	1.1	444
Heart disease	61.7	0.63	7.4	2829
High blood pressure	59.9	0.54	25.8	9774
High cholesterol	60.2	0.53	10.9	4154
HIV	42	0.72	0.5	194
Mental health	49.3	0.43	9.1	3498
Multiple sclerosis	48.8	0.33	1.1	413

COPD, chronic obstructive pulmonary disease; HIV, human immunodeficiency virus.

Table 2. List of behavioral questions

How often have you ...
Worn a face mask outside your home?
Washed hands with soap and water?
Used hand sanitizer?
Covered your nose and mouth when sneezing or coughing?
Avoided contact with people who have symptoms or you think may have been exposed to coronavirus disease?
Avoided going out in general?
Avoided going to a hospital or other health care setting?
Avoided taking public transport?
Avoided working outside your home?
Avoided letting your children go to school/university?
Avoided having guests in your home?
Avoided small social gatherings (not more than 2 people)?
Avoided medium-sized social gatherings (between 3 and 10 people)?
Avoided large-sized social gatherings (more than 10 people)?
Avoided crowded areas?
Avoided going to shops?

Age

The correlation between age and compliance for each type of behavior can be seen in [Figure 1](#). A positive value indicates that higher ages would have higher adherence, whereas a negative association would mean that older people reported following the restriction less stringently.

The strongest positive dependency on age was for avoiding crowds, washing hands, avoiding gatherings of all kinds, and avoiding public transport.

Gender

Of the 20 behaviors examined and listed in [Table 2](#), women self-reported greater mean compliance than men for 17. The exceptions were eating separately, avoiding the workplace, and having separate bedrooms. Independent samples t-testing for the difference

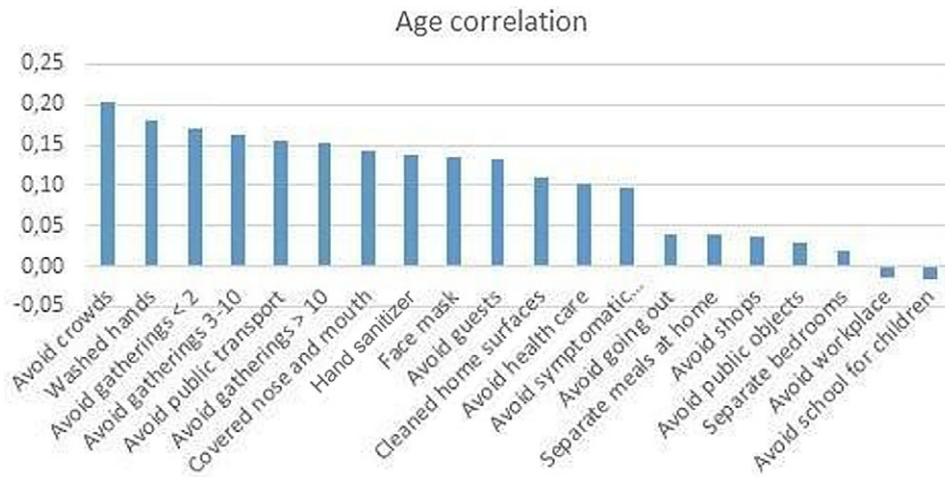


Figure 1. Correlation age and social distancing behaviors.

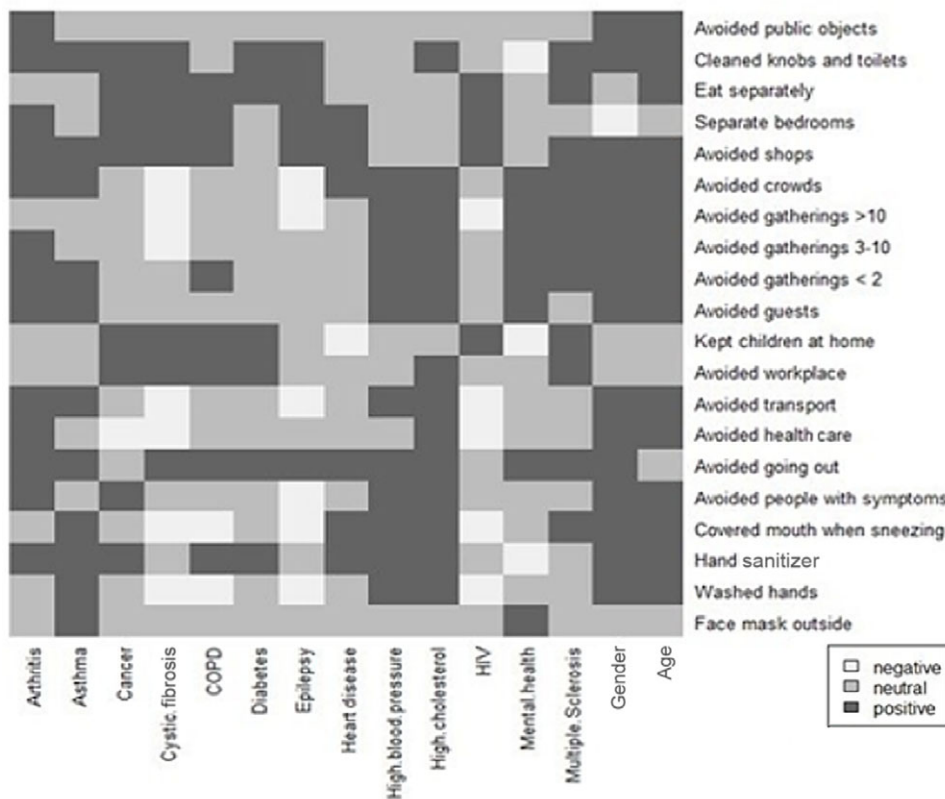


Figure 2. Behavioral effects of age, gender, and pre-existing conditions.

in means between the groups revealed that the differences between men and women were significant for all 20 questions.

Health

The results of the regression model are presented as a heatmap in Figure 2, where the color is based on whether the regression coefficient was significantly negative (negative), not significant (neutral), or significantly positive (positive).

Age and gender have a positive effect on nearly all measured behaviors and must be considered the main determinants. This is consistent with the results presented above and now also considered in the presence of other factors. Regarding the presence of pre-existing health care conditions, there is a more complex picture. Individuals with high cholesterol, asthma, arthritis, high blood pressure, and multiple sclerosis were the most strongly compliant, whereas those stating HIV/AIDS, epilepsy, and cystic fibrosis exhibited overall adherence around the same as those with no disease.

Discussion

This study examines how certain social factors influence compliance to COVID-19 health regulations in Germany. The willingness to adhere to a number of social distancing measures differs for age, gender, and chronic pre-existing health care conditions. The results clearly show that these factors are associated with variations in compliance. Those in the older age range proved more compliant than those in the younger age range, in particular for behaviors related to gatherings. Females were more willing to comply across a range of measures. Age and gender are the most important factors for determining compliance levels. The presence of pre-existing conditions was not as important, being dependent on the condition involved.

The age gradient was most distinct for behaviors related to avoiding gatherings of various sizes. Government recommendations suggested limiting meetings with older people, and many older adult care housing units were closed for visitors.

Females are generally known to better comply with health care advice than males, and the reasons underpinning this are unclear. Many authors provide explanations, including that females are generally more likely to listen to guidance, have a heightened sense of risk, and are more health aware.¹⁰⁻¹² The significant differences between the genders in favor of higher adherence for females in 17 out of 20 behaviors confirm these observations. It could be noted that the biggest differences came in habits related to increased personal hygiene, such as cleaning shared objects, washing hands, covering mouth when sneezing, and wearing face masks.

Greater overall compliance in those with pre-existing health care complaints is as expected. The prognosis in the event of a COVID-19 infection is known to be worse for those with a range of complaints, most notably diabetes; so, those with such conditions would be expected to comply more. A study examining behavioral differences in those with various pre-existing health care conditions found notable differences in adherence depending on the condition.¹³

However, some of the variations in a willingness to comply seen between health conditions were quite unexpected, which calls for further study. Those with the conditions cystic fibrosis, HIV/AIDS, and epilepsy followed general guidelines less strongly but conversely adhered to a considerably higher degree of recommendations to isolate for meals and sleep. There appears to be 2 mechanisms in action here: first, the young age of those with these conditions (age correlates with less distancing), and, second, the viral pathways of spread for both cystic

fibrosis and HIV/AIDS, making those patients more cautious about intimate contact.

It should be noted that adherence did not change much during the time period, even in the face of changing government restrictions. Hence, the approach to use aggregated data for all sampling dates could be justified.

A limitation of the study is that responses are based on self-reporting. There is some concern about whether people will answer honestly or show a tendency to give the “politically correct” response,¹⁴ and it is unclear whether there would be a difference in self-reporting bias between genders and ages.¹⁵

A strength is that a set of standard questions was studied over an extended period, as regulations changed and the epidemiological status of COVID-19 altered in Germany. The resource made available in the Behavioral Tracker provides a unique opportunity to examine how attitudes altered over time as the pandemic progressed and knowledge and awareness of the virus changed.

Conclusion

Patterns in social distancing in Germany during the COVID-19 pandemic were examined. Females were more stringent than males in their level of adherence. This is in accordance with risk aversion tendencies, which are known to be greater for females. Older people were more willing to follow social distancing, especially those regarding large crowds, throughout the studied period. This confirms the expected patterns based on their greater risk of severe COVID-19 symptoms and mortality.

Those with a serious health care condition were, in most cases, more likely to comply with social distancing policies, except those with cystic fibrosis in particular, and to some extent those with HIV/AIDS and epilepsy. It appears that respondents with health care conditions had higher levels of awareness as potentially having more serious consequences of the COVID-19 infection if they contracted it. Generally, those with conditions associated with a higher COVID-19 risk also complied more to social distancing measures, but better medical quantification of COVID-19 infection risks could further improve the understanding of observed behavioral differences in social distancing compliance.

Ethical standards. No ethics permission was necessary as all data were secondary and downloaded from a public repository.

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