Kisses, Handshakes, COVID-19 – Will the Pandemic Change Us Forever?

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Abstract

We study the changes in greeting behavior caused by the COVID-19 pandemic. We find that after the use of handshakes and social kissing as forms of greeting decreased drastically, they became common again already a few months after the outbreak. Nevertheless, a consistently large proportion of respondents (around 57%) plan to change their greeting behavior permanently, either because they simply became used to it or because they want to avoid the danger of contracting and transmitting infectious diseases. As can be seen from the results of the first survey wave (April 2020), the belief in conspiracy theories about COVID-19 did not influence the greeting behavior of individuals, but it proved to have a strong impact in the second survey wave (September 2020).

Keywords: COVID-19; SARS-CoV-2; handshakes; social kissing; greetings; habitual changes; conspiracy theories.

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1 Introduction

The COVID-19 pandemic which started in late 2019 in Wuhan, China, has led to dramatic changes around the globe. On March 11, 2020, the World Health Organization (WHO) announced that the COVID-19 epidemic had become a pandemic, affecting all regions in the world. Europe was declared the epicenter of the pandemic on March 13 (World Health Organization 2020). As of March 25, all EU countries except Sweden had imposed various lockdown measures that severely restricted business and educational activities and the individual freedom of movement (Hale, Angrist, Cameron-Blake, Hallas, Kira, Majumdar, Petherick, Phillips, Tatlow & Webster 2020). Lockdowns in other parts of the world followed.

Even before the severe government restrictions were imposed, the population was advised by the national health authorities and the WHO alike to adopt certain sanitary measures, to avoid crowded places and practice physical distancing. Yet, whereas compliance with the lockdown restrictions is ensured by imposing fines in case of violations, most sanitary measures remain voluntary. For example in Germany, where wearing face masks at certain locations, for example in shops, became mandatory in April, there are no penalties that would ensure that people regularly wash their hands, refrain from handshakes, sneeze into the elbow etc., because the violations of these behavioral rules would be very hard to monitor. In this paper, based on two survey waves conducted in April during the nationwide lockdown in Germany, when infection numbers were high, and in September, when the number of new infections was low and many Corona restrictions had been lifted again, we investigate how Germans voluntarily adjusted their greeting habits in the wake of the COVID-19 crisis and whether these changes may become permanent.

Behavioral changes occurred in the relatively early stages of the pandemic - even before government restrictions on mobility and social and business activities were imposed to contain the epidemic. As regards the changes in the consumption behavior, consumers started hoarding certain goods, such as canned food and toilet paper, fearing interrupted supply chains and the possibility of facing quarantines or shop closures (Laato, Islam, Farooq & Dhir 2020). The demand for services that require social interaction was reduced (see e.g. Campagnaro, de Oliveira Collet, Podadeiro de Andrade, da Silva Lopes Salles, de Lourdes Calvo Fracasso, Lopes Salles Scheffel, Salvatore Freitas & Santin (2020) for Brazil and Abay & Ibrahim

(2020) for Egypt), whereas the demand for services that substituted personal interactions increased. Mobility in general (Brinkman & Mangum 2020), and especially the use of public transport (for those who could afford it) (Brough, Freedman & Phillips 2020), fell dramatically as fears of possible infection increased. In the U.S., an across-the-board rise in consumer spending at the end of February and at the beginning of March was followed by a precipitous drop around March 10 (Baker, Farrokhnia, Meyer, Pagel & Yannelis 2020). For the U.S., Goolsbee & Syverson (2020) found that the observed decline in consumer traffic by 60% was mainly caused by voluntary shifts in behavior in response to local increases in COVID-related mortality and clearly predated shutdown orders.

At the same time, changes in behavior more directly linked to hygiene could be observed. Thorough and frequent handwashing and other preventive measures were advised by national health authorities and WHO alike as soon as the information surfaced in January 2020 that the novel Coronavirus could be transmitted from person to person. The population started to follow this advice despite the fact that as of January, there were only very few cases reported outside China. Knowles & Olatunji (2020) showed for a sample of undergraduate students enrolled at a U.S. university that the students who were afraid of contagion were at an increased risk of developing obsessive-compulsive washing symptoms in the early phase (January to March 2020) of the COVID-19 crisis. In Germany, frequent handwashing and sneeze-and-cough etiquette were also advised early on, despite the fact that the head of the German national health authority, the Robert Koch Institute (RKI), claimed on January 27, 2020, that it estimated the risk posed by the virus to the health of the German population to be very low.[1] This assessment of RKI remained unchanged until March 2, but then it was changed to moderate[2] as more and more COVID-19 cases across Germany were reported, among them the first severe case in Gangelt, county Heinsberg, for which the chain of infection remained unresolved. But whereas some stores were already running out of disinfectants, the health authorities in Germany reassured the public that thorough handwashing with soap would be enough to prevent the spread of the virus and that wearing face masks was not necessary for people that were not in the health care system. This

[1] https://www.zdf.de/nachrichten/heute/robert-koch-institut-kaum-corona-gefahr-in-deutschland-100.html

[2] https://www.tagesschau.de/inland/coronavirus-deutschland-153.html

assessment was later completely overturned, and by the end of April, wearing face masks at certain locations became mandatory.[3]

The custom of shaking hands dates back to at least 3,000 years (Oxlund 2020). Today, the custom is universal, but with clear differences concerning the circumstances in which handshaking is used. In Germany, it is a standard way of greeting in any kind of meeting – be it a business meeting or a personal one. Hugs and kisses, in contrast, were not a common way of greeting in Germany in previous generations, except when meeting a close family member. In the last decades however, this custom has become more popular. More females than males and younger rather than older people use hugs and kisses to greet one another, whereas this form of greeting is still very uncommon in official meetings and when people of different status, age, or gender meet.

Given that any type of physical contact carries the risk of spreading infectious diseases, it is not surprising that the COVID-19 pandemic also had an impact on the greeting behavior. People started to reduce the number of social interactions, and thus the pressure to greet people using the traditional forms of greeting decreased, and people started to change their greeting behavior. Mondada, Bänninger, Bouaouina, Camus, Gauthier, Häggi, Koda, Svensson & Tekin (2020) document this change in an ethnographic study conducted in Basel – in the German-speaking part of Switzerland. At the beginning of the pandemic, the young people, whose behavior was observed in the study, continued to greet their friends with hugs and kisses. Later, the interaction became more awkward and people hesitated to greet each other the traditional way, and finally routine greetings were rejected and abandoned in favor of non-standard ways of greeting such as elbow bumps or footshakes. In accordance with this ethnographic evidence, Schulze, Bock, Dittmer, Flörchinger, Lorenz, Merkes & Voss (2020) found in a national survey for Germany in March 2020 that 90% of the respondents avoided handshakes because of the Corona pandemic. Similar findings also emerged for other countries in the same time period, even for the countries where handshakes are less common than in the Western world (e.g. Alsayali, Abdulrashid, Ibrahim, Al-Osaimi, Dashash & Al-Raddadi (2020) for Saudi-Arabia). It is interesting to observe how quickly these changes occurred, given the long-lasting difficulties in the efforts aimed at

[3] https://www.tagesschau.de/inland/corona-maskenpflicht-103.html

stopping handshakes in health care interactions (Sklansky, Nadkarni & Ramirez-Avila 2014).

In our study, we use responses from two survey waves conducted at Trier University in Germany in April and September 2020, and, as in the above-mentioned studies from March 2020, we also find that the Corona crisis has changed the way people interact when they meet, but we go beyond this and also study subsequent behavioral changes. In the April wave, we observed a strong decline in the use of handshaking and social kissing. As of September, some people – but clearly a minority – have switched back to the pre-Corona greeting behavior, even though recommendations have not changed.[4]

Interestingly, in the April survey, the respondents, whose behavior in terms of handshaking and social kissing had not changed as compared to the pre-Corona period, did not really differ from other respondents as regards their personal characteristics. In the September wave, however, the belief in conspiracy theories about COVID-19 proves to be a strong driver for keeping up (or re-establishing) the traditional forms of greeting in face of the still-raging pandemic.

There are various conspiracy theories in circulation, but the main ideas behind these theories are typically the following: it is argued that the virus is not as dangerous as the government claims it to be and that the virus was either artificially created or at least the undertaken countermeasures were purposefully exaggerated in the interests of a few influential people.

People who tend to believe in such conspiracy theories may continue to use handshaking and social kissing when greeting others to show that they believe that the threat posed by COVID-19 is intentionally being exaggerated. We find this effect only in the September wave of our sample, but not in the April wave. Our results differ from the results of the study by Swami & Barron (2020) conducted in the United Kingdom in April, according to which people who believed in conspiracy theories about COVID-19 were less likely to obey social distancing rules.

Another main finding is that the majority of the respondents do not plan to return to the pre-Corona greeting forms once the pandemic is over. Whether these plans will be realized remains to be seen, but the percentage of respondents who plan to change their behavior permanently remains surprisingly constant when comparing

[4]This is a similar phenomenon that has already been found for changes in mobility patterns during the lockdown in several countries (Rieger & Wang 2020).

the April and September surveys. This suggests that these plans are very stable and it is, therefore, highly likely that they will be implemented. Additionally, the majority of the respondents in our survey state that self-protection and the protection of others are the main reasons for permanently changing their greeting behavior, so it seems likely that these behavioral changes will, indeed, persist, considering that tactile greetings are seen as a potentially serious health threat. These behavioral changes may prove to be beneficial in case of future pandemics. It is certainly noticeable that the spread of COVID-19 has been largely contained in many East Asian countries where tactile greetings are less common, although many other differences also exist. It has also been found that non-pharmaceutical interventions and personal protection measures during previous flu and SARS epidemics were, in fact, effective in reducing mortality rates and containing the spread of the disease if introduced early on (Balinska & Rizzo 2009). Hence, if more cautious behavior prevailed, it would be possible to better contain future pandemics.

This paper is structured as follows: In Section 2, the used methodology and data are described. Section 3 presents the empirical results both for actual and planned changes in greeting behavior. Section 4 provides a brief discussion of the main findings and possible caveats with regard to the interpretation, and Section 5 concludes.

2 Methodology and Data

The data used in this study were collected as part of an ongoing regular survey that started in March 2020 and was advertised at Trier University in Germany. Up to now, the survey contains data from 1153 subjects in total. The two waves (April and September), where the data on greeting behavior were collected, contained 405 subjects. Table 1 provides an overview of sample characteristics.

The survey was advertised through the university email system and as an incentive to participate, a prize of 50 Euro was offered to a randomly selected participant in each survey wave. The standardized recruiting led to fairly similar sample characteristics. The sample is not representative of the German population, since most of the respondents were students (64.2% in April and 73.7% in September) and women (64.4% in April and 71.2% in September), but the sample selection allows comparisons over time and the obtained data can be used for multivariate analysis.

Table 1: Sample characteristics

		April 2020	September 2020
Age	Average	28.3 (0.6)	26.7 (0.7)
	Minimum	18	18
	Maximum	77	61
Gender	Male	34.8% (2.9%)	28.8% (3.9%)
	Female	64.4% (2.9%)	71.2% (3.9%)
	Others	0.7% (0.5%)	0.0% (—)
Students		64.2% (2.9%)	73.7% (3.8%)
Working		31.7% (2.8%)	22.6% (3.6%)
N		268	126

Given that demographic characteristics were mostly not significant in our study, we can also assume that the results may also carry over to the general population at least in Germany.

The online survey was programmed in Questback. The total survey took approximately 10 minutes to complete. A detailed description of the items and the survey data are available in Rieger & He-Ulbricht (2020).

The central items of the survey for this paper are the following:

– How have you behaved regarding handshakes since the beginning of the Corona epidemic?

1. I continue to greet others with a handshake.

2. I shake hands with others less often.

3. I only shake hands with others in exceptional cases.

4. I no longer shake hands with anyone.

– How have you behaved since the beginning of the Corona epidemic regarding kisses to greet friends?

1. I still greet friends with kisses.

2. I do this less often than before.

3. I only do this in exceptional cases.

4. I no longer greet friends with kisses at all.

5. I have never done this anyway.

– How will you probably behave with regard to shaking hands after the end of the Corona epidemic?
1. I will greet others with a handshake as before the epidemic.
2. I will do this less often.
3 I will only do this in exceptional cases.
4. I will shake hands with no one any more.
– After the end of the Corona epidemic, how will you probably behave regarding welcome kisses?
1. I will give a welcome kiss to friends as before the epidemic.
2. I will do this less often than before.
3. I will only do this in exceptional cases.
4. I will not do it anymore.
5. I have never done this anyway.
– What would be the main reasons for your welcoming behavior to have changed even after the end of the Corona virus epidemic?
The new habits will simply remain.
To prevent myself from being infected with other diseases (colds, flu...)
To prevent other people from contracting other diseases (colds, flu...).
Other reasons.
(For the last item, more than one response could be selected. For the further analysis of social kissing, people who stated to have refrained from kissing as a greeting form even before the pandemic were excluded.)
From a total of 405 respondents, those who completed the survey in an unreasonably short time or gave incomplete answers were excluded, leaving 394 subjects for the further analysis.

3 Results: Changes in Actual and Planned Greeting Behavior

In Germany, handshakes are the standard way of greeting people in personal meetings; social kissing is a more recent trend. In order to curb the spread of COVID-19, physicians and politicians alike started to warn against these habits once the first case of infection was recorded in Germany at the end of January 2020. To study

how the appearance of the novel Coronavirus affected the greeting behavior of the Germans, we conducted a survey in two waves, one in April and one in September 2020. The total number of observations in the two waves combined equaled 326, with the observation number equaling 200 in April and 126 in September.

Table 2: Handshake activity: during and after COVID-19.

Handshake activity during crisis in %				
wave	same as before	less	only in exceptions	stopped
April	0.5	4.6	18.3	76.6
September	2.4	17.6	46.4	33.6
Planned handshake activity post-Corona crisis in %				
wave	same as before	less	only in exceptions	stop
April	44.2	38.1	13.2	4.6
September	42.4	40.0	14.4	3.2

Table 2 shows that the Corona crisis had an evident impact on the greeting behavior in our sample. Both in April and September, the overwhelming majority of survey participants reported to shake hands less frequently[5] as can be seen in the upper section of Table 2. However, from April to September, the percentage of people who did not shake hands at all fell dramatically from more than three quarters to about one third. While this may seem like a sharp decline, once we pool the responses of no handshaking and handshaking only in exceptional cases, we see that this combined number did not decline that much: in April, about 95% and in September, 80% of the respondents belonged to this category. The percentage of respondents who did not change their handshaking behavior as compared to the pre-Corona period remained small: in April, 0.5% of the survey participants continued to shake hands when greeting others, vs. 2.4% in September.

The second half of Table 2 presents the survey results for the question on how the respondents plan to greet each other once the Corona crisis is over. There we observe that more than half of the respondents plan to permanently refrain from shaking hands as compared to the period before the crisis, and interestingly, this

[5]The data are consistent with the representative sample from Bertsch (2020) for October 13, 2020, where 89% stated that they avoided shaking hands always or frequently.

result seems to remain stable across the two waves (55.6 % in the April wave and 57.6% in the September wave plan to refrain from handshaking), despite the fact that the reported actual behavior has changed from April to September. If anything, the reported plans have changed towards more cautious behavior in the future.

Unlike handshaking, social kissing is a relatively new greeting form in Germany and is primarily prevalent in female sub-populations (which seems to be similar to the situation in the U.S. (Olson 2006)). Although the percentage of students is high in our survey, only about 30% of the respondents state having used cheek kissing when greeting others before the pandemic.[6] As regards handshaking, in Table 3, we see that for the reported current behavior, from April to September, the percentage of respondents who stated to have refrained from social kissing declined. Whereas in April, only 1% of the respondents reported greeting each other with kissing, in September, this percentage had increased to 4%. Moreover, whereas in April, 22.8% of the respondents stated that they had engaged in social kissing prior to the pandemic and had completely stopped as of April, the percentage of these respondents had dropped by more than half to 11.2% in September.

Behavioral changes with regard to social kissing as well as for handshaking are highly correlated (Pearson correlation 60.2%, $p < 0.001$). There is also a strong correlation with other protective measures, notably the frequency of wearing masks[7] (Pearson correlation with handshaking 32.2% and with social kissing 47.7%, both with $p < 0.001$).

As regards the planned behavior after the end of the Corona crisis, more than 50% of the respondents who stated to have ever engaged in cheek kissing as a greeting form plan to return to their pre-Corona behavior. As regards handshaking, the percentage of such respondents was below 50%. So, there is a difference, but the overall proportion of the respondents who plan to permanently refrain from social kissing is also substantial. Just as for handshaking, differences in the waves with regard to the planned behavior are relatively small and lie within the statistical margin of error, quite in contrast to the results for actual behavior. This suggests that these plans are already rather stable and are, therefore, more likely to be implemented.

[6] 34% of all females and 23% of all males, where the mean age of the respondents using social kissing is slightly but significantly higher (29.4 years versus 26.6 years).

[7] Following the definition of Rieger (2020*b*).

Table 3: Social kissing: during and after COVID-19

Social kissing activity during crisis in %					
wave	same as before	less	only in exceptions	stopped	never done it
April	1.0	3.6	2.0	22.8	70.6
September	4.0	8.8	6.4	11.2	69.6
Planned social kissing activity after Corona crisis in %					
wave	same as before	less	only in exceptions	stop	never done it
April	18.8	7.6	3.6	2.5	67.5
September	16.0	8.0	4.8	1.6	69.6

Differences in the reported behavior may be caused by differences in beliefs about the causes of the Corona crisis. In particular, according to some conspiracy theories in circulation, the COVID-19 virus was created intentionally and spread in order to subjugate the population, e.g. plant microchips during mass vaccinations and then remotely control the vaccinated individuals. Persons who believe in such theories may be more inclined to persist in their behavior and in general downplay the dangers posed by the virus. In Germany, during the summer of 2020, several mass protests against Corona regulations took place, and violations against Corona safety regulations, such as the rule to wear masks, were frequently observed during these events. While the protesters came from different political backgrounds, a strong driving force behind the protests were right-wing groups and the proponents of various conspiracy theories (Vieten 2020).

Table 4 shows the results of a linear probability estimation for the September wave of the survey, where the likelihood of believing in conspiracy theories is regressed on several personal characteristics, such as age, gender, student status, whether or not a person has a job (not including student part-time jobs) and the respondent's political orientation.[8] The dependent variable is an indicator variable that takes on the value 1 if the conspiracy score is 11 or higher (maximum possible score being 38, following the definition by Rieger (2020*a*)).

We see that demographic factors play a mostly insignificant role (which suggests

[8]Questions about political preferences were asked only in the September wave, hence the lower number of observations.

that our results may be extended to a more general population). Only the female dummy is marginally significant. Support for the right-wing party Alternative for Germany (AfD), however, has a highly significant and large effect. One point more on the Likert scale of supporting this party leads to being 14.5% points more likely to score high in the conspiracy theory measure. There are, however, only relatively few respondents (14.9%) in our sample who stated to have at least a non-zero chance of voting for the AfD, and only 5.8% stated that they will definitely vote for this party, while nation-wide opinion polls gave the AfD around 10% at the time of the survey.[9] The relatively low number in our survey, however, is not surprising for two reasons: First, the social desirability bias is well-known for obfuscating support for right-wing parties in Germany (although we mitigated the problem by providing participants with the Likert scale instead of a clear election decision). Second, most survey participants were students and the AfD maintains a lower voter support in this demographic group.

Next, we investigate the determinants of the reported actual and planned handshake behavior in a multivariate ordinary least squares regression analysis. We do not conduct a similar analysis for social kissing because the number of people who engaged in this form of greeting before the crisis is relatively low.

In Table 5, we choose the actual reported handshaking behavior as the dependent variable. The estimated coefficient on the constant clearly shows that most people have reduced hand-shakes. Neither age, gender, student status nor whether or not the person has a job have a statistically significant influence on the greeting behavior, although the female dummy coefficient has a positive sign and the student and working dummy coefficients are negative and relatively high in absolute value.

In the first column of Table 5, two variables are added. The first one measures the extent to which respondents admit to worrying about the Coronavirus on a Likert scale from 1 to 5, with 5 indicating high worries. The second is a dummy variable for the September wave of the survey. It takes on the value of 1 in the September wave, 0 in the April wave of the survey. In column 1, the Corona worry indicator variable is positive, but statistically significant only at the 10% level. Not surprisingly, when a person is particularly worried about the Coronavirus, he or she will be more cautious. The impact on handshaking is moderate, however, with a point

[9] See, e.g., https://www.wahlrecht.de/umfragen/ for a collection of German polling data with time series.

Table 4: Likelihood of believing in conspiracy theories.

dependent variable	conspiracy theory leaning
constant	0.260
	(0.357)
age	-0.002
	(0.006)
female	0.141^{+}
	(0.083)
student	-0.081
	(0.247)
working	-0.096
	(0.245)
left	-0.030
	(0.026)
right	0.145^{***}
	(0.041)
center	-0.036
	(0.043)
adjusted R^2	0.096
# observations	113

Notes: Standard errors are reported in parentheses.

$^{+}$ $p < 0.10$, * $p < .05$, ** $p < .01$, *** $p < 0.001$.

estimate of 0.070. In contrast, the coefficient for the September wave indicator is large with a value of -0.593 and statistically significant at the 0.1% level. Clearly, there has been a change towards a less cautious behavior in September versus April, quite in line with the reduction in the number of active Corona infections and the relaxation of the lockdown restrictions in September as compared to April.

In column 2, the conspiracy belief variable (dependent variable in Table 4) and an interaction term between this variable and the September dummy are added to the regression. As a consequence, the Corona worries dummy loses significance, and both the Corona worries and the September dummy coefficients become smaller. The conspiracy variable coefficient is small and statistically insignificant, but the interaction term displays a high coefficient of -0.456 which is statistically significant at the 1% level and almost as high as the September dummy coefficient itself. Interestingly, belief in conspiracy theories was not more prevalent in September than in April (Rieger 2020*a*), but in April, these beliefs did not really affect the respondents' behavior, whereas in September, the belief in conspiracy theories with regard to the Coronavirus led to a less cautious behavior, manifesting itself in more handshaking than in April. As regards the increased engagement in handshaking by conspiracy theory believers in the September wave, one can argue that in September, the risks of shaking hands were still small as compared to April and to the current situation at the end of October 2020. In other words, in September, engaging in handshaking was a relatively risk-free statement of disagreeing with the existing Corona regulations. Finally, column 3 shows that these results remain robust when removing the Corona worries variable altogether.

The next table explains the determinants of planned changes in the habit of handshaking after the end of the Corona pandemic. The regression, with its results reported in Table 6, contains the same explanatory variables as Table 5, but the dependent variable measures the reported planned behavior in the future once the Corona pandemic is over. If the person states that he or she will engage in handshaking to the same extent as before the crisis, the value taken is 1. In contrast, values higher than 1 mean that the person will remain cautious and will engage in handshaking to a lower extent than before the pandemic. The results differ markedly from the results with regard to the current behavior. Women will engage in handshaking to a lower extent as compared to the pre-crisis situation even after the end of the pandemic. This effect is quite large and statistically significant at

Table 5: Factors influencing actual behavior regarding handshakes during the pandemic.

dependent variable	model 1	model 2	model 3
constant	3.555***	3.593***	3.733***
	(0.297)	(0.297)	(0.277)
age	0.002	0.003	0.003
	(0.005)	(0.005)	(0.005)
female	0.077	0.097	0.112
	(0.079)	(0.079)	(0.078)
student	-0.191	-0.201	-0.186
	(0.227)	(0.225)	(0.225)
working	-0.206	-0.219	-0.208
	(0.230)	(0.228)	(0.228)
worries Corona	0.070^{+}	0.052	
	(0.040)	(0.040)	
September	-0.593***	-0.493***	-0.501***
	(0.077)	(0.087)	(0.087)
conspiracy		0.010	0.015
		(0.105)	(0.105)
conspiracy $\times$ Sept.		-0.456**	-0.487**
		(0.177)	(0.177)
adjusted R^2	0.168	0.189	0.187
# observations	318	318	318

Notes: Standard errors are reported in parentheses.

$^{+}$ $p < 0.10$, * $p < .05$, ** $p < .01$, *** $p < 0.001$.

at least the 5% level. Worries about the Coronavirus matter for a lasting effect on handshaking habits. This finding may appear odd at first glance since the question concerns the behavior after the Corona crisis is over. A possible explanation may be that people imagine the post-Corona situation as one where the virus can be successfully treated, but it will continue to exist among the population and will still pose a potential threat. More generally, the documented impact can also be intuitively explained by a higher awareness of the dangers of handshaking as a possible channel for spreading infectious diseases. We will see later whether this explanation is valid.

The conspiracy variable coefficient is also relatively large in size, but only borderline statistically significant if the Corona worries variable is eliminated from the regression. The positive sign comes as somewhat of a surprise at first glance because in the regression with regard to the current behavior, persons with stronger beliefs in conspiracy theories were less likely to reduce handshaking, at least in the September wave. But when we compare the results more closely, we see that once we omit the Corona worries variable, which had a highly significant and highly positive coefficient, the coefficients on the constant, the female dummy and the conspiracy variable all rise. Since females show a stronger tendency to believe in conspiracy theories in our sample and also worry more about Corona, this change itself is not unexpected. Leaving out the Corona worries variable as one of the apparent drivers of planned handshaking activity leads to a model misspecification, and thus, the results in column 3 should not be over-interpreted.

In the survey, we also asked the respondents to state the reasons of their willingness to permanently change their behavior. The following Table 7 shows their replies (More than one reason could be named. Only those who stated that they plan to change their behavior permanently were asked this question).

A clear majority of the respondents (54% to 60%) stated that they want to change their greeting behavior permanently in order to avoid either contracting a disease themselves or infecting others with various other diseases (like influenza). The reported numbers of respondents naming one of these two reasons are almost equal, although the numbers for the seemingly more altruistic motive of protecting others slightly exceed those for the seemingly more egoistic motive of self-protection.

We may have to discount the "altruistic" answer, however. Recasting self-interests as altruistic motives in order to appear better (or even feel better) by giving socially

Table 6: Factors influencing planned behavior regarding handshakes after the end of the pandemic

Dependent variable	Model 1	Model 2	Model 3
constant	0.872*	0.738*	1.563***
	(0.354)	(0.355)	(0.351)
age	-0.005	-0.005	0.006
	(0.006)	(0.006)	(0.006)
female	0.191*	0.178*	0.262**
	(0.095)	(0.094)	(0.099)
student	-0.025	0.015	0.103
	(0.271)	(0.269)	(0.285)
working	-0.029	0.025	0.088
	(0.275)	(0.272)	(0.289)
worries Corona	0.288***	0.303***	
	(0.048)	(0.048)	
September	0.060	0.014	-0.033
	(0.092)	(0.104)	(0.110)
conspiracy		0.197	0.288^{+}
		(0.126)	(0.133)
conspiracy $\times$ Sept.		0.259	0.075
		(0.211)	(0.222)
adjusted R^2	0.112	0.134	0.024
# observations	318	318	318

Notes: Standard errors are reported in parentheses.

$^{+}$ $p < 0.10$, * $p < .05$, ** $p < .01$, *** $p < 0.001$.

Table 7: Reasons for long-term change of behavior.

	% of respondents	
reason	April	September
new habits	46	46
avoid self-infection	54	57
avoid infecting others	58	60
other reasons	16	14

desirable answers (social desirability bias), is a well-known phenomenon in psychology (Nederhof 1985). Also, from an economic perspective, if the well-being of others, and especially of family members and friends, is an argument in the individual utility function, the difference between self-interest and altruism becomes blurred. In another study about the usage of protective behavior, including the avoidance of handshakes, during the Corona crisis in Germany, Leder, Pastukhov & Schütz (2020) found that not only self-protection was the major driver behind protective behavior, but that also the costs of protective behavior played a role, suggesting a form of cost-benefit analysis.

In general, however, the distinction between egoism and altruism is less relevant: as we know from economic theory, under certain conditions the pursuit of individual self-interests leads to a socially optimal outcome (first theorem of welfare economics). Thus, the answers "avoid self-infection" and "avoid infecting others" should not be seen as conflicting, and it is also not surprising that 43% of the respondents did give both reasons.

For our survey, the important message is that a clear majority of respondents changed their greeting behavior because they understand that this change is important to curb the spread of other diseases which will be beneficial both to themselves and to the society they live in.

The pragmatic response that the behavioral change will become permanent simply because one gets used to it is also given often by the respondents, but by slightly less than half of them.

Other reasons for a permanent change in behavior are apparently of minor importance (reported by 16% and 14% of the respondents in the two waves), which suggests that we have covered all important reasons for the behavioral change in

our survey.

We now want to investigate which of these reasons is responsible for the aforementioned observation that people who are more worried about COVID-19 are more willing to permanently change their behavior. To this end, we conduct OLS regressions for the three stated reasons for a permanent behavioral change (new habit, avoid getting infected with other diseases, avoid infecting others with such diseases, see Table 8) and find that worries about COVID-19 are, indeed, a highly significant factor for only one reason: worries about getting infected.

This suggests that there is a group of people that are seriously worried about contracting a disease – either COVID-19 or other infectious diseases – and plan to take the current pandemic situation as a proper occasion to change their behavior permanently.

Table 8: Factors influencing the importance of various reasons for lasting behavioral changes regarding handshakes after the COVID-19 pandemic

	avoid self-infection	avoid infecting others	new habits
(constant)	0.056	-0.109	0.704*
	(0.169)	(-0.329)	(2.094)
age	-0.003	0.001	-0.012*
	(-0.538)	(0.112)	(-2.052)
female	-0.115	-0.016	0.03
	(-1.392)	(-0.198)	(0.359)
student	0.297	0.585*	0.155
	(1.177)	(2.318)	(0.605)
working	0.326	0.634*	0.26
	(1.263)	(2.455)	(0.992)
worries Corona	0.106*	0.03	-0.034
	(2.548)	(0.726)	(-0.8)
# observations	183	183	183
adjusted R^2	2.98%	0.99%	0.48%

4 Discussion

The main findings of our study are quite clear:

- A rapid decline in the use of forms of greeting that can potentially contribute to the spread of the virus after the outbreak of COVID-19, which was, however, followed by a (smaller) gradual cancellation of these changes and a return to previous behavior.
- A stable number of respondents who are willing to permanently change their greeting behavior for various reasons.
- A strong influence of the tendency to believe in conspiracy theories on the behavior of the respondents in September, but not in April, or on the planned behavior in the post-COVID-19 period.

There are, however, a couple of potential issues regarding our study that need to be discussed further. An obvious point for criticism is that our sample is not representative. While we agree that females and students (and thus also the young) are over-represented due to the way how our sample was drawn, we would like to point out three arguments in support of our procedure: First, our sampling allowed for very speedy surveys, reacting immediately to new developments of the unfolding crisis, with a sample composition that was very similar between different waves. Second, the conclusions that we draw are about the changes over time, dependencies between different variables, and a few very clear descriptive numbers. Therefore, it seems very unlikely that these results will not hold in a different sample. Third, the regression analysis that we conducted shows that demographic characteristics do not really matter for the behavioral patterns that we investigate: only minor gender differences are occasionally found, but the factors that differentiate our sample most from a representative sample – the high number of university students, the low mean age and the low number of working people – are never significant factors. Therefore, a more balanced sample would probably give very similar descriptive results. In case of the general handshaking behavior during September/October 2020, we can even verify this by looking at a representative survey that yielded very similar numbers, as pointed out before (Bertsch 2020).
Another potential issue is a standard problem of survey-based research: people may say one thing, but do another. Indeed, we do not measure actual behavior, and

thus, beliefs about social desirability may lead to overreporting of behavior that curbs the spread of the disease. Again, we would like to argue that this effect will be relatively independent of time and co-variates, so we expect it to be less of a problem, as already discussed in the results section.
A final potential problem may be that the prognosis of future behavior may simply turn out to be wrong. Indeed, it is conceivable that even a strong minority who would like to refrain from handshakes in the future will be forced by "social pressure" from the majority to resume their previous behavior. Whether this will be the case, only the future can tell. In any case, we find it very interesting that the planned future behavior deviates substantially from the pre-pandemic behavior and that it – as opposed to the reported actual behavior – did not change over time at all. Such a stable plan may not be changed so easily by social circumstances, but again, future studies will be needed to answer the question whether behavioral changes will become permanent.

5 Conclusions

We found that the COVID-19 pandemic has not only dramatically changed behavioral patterns with regard to greetings, but that a large proportion of people plan to at least partly keep up these changes after the end of pandemic. We have also seen how the belief in conspiracy theories has started to modify behavioral patterns in the later wave of our sample, whereas the reported behavior in the earlier wave was not affected by it. More studies will be needed to investigate how the behavior will change in the future and whether some of the behavioral changes that not too long ago seemed strange and weird to Germans when they observed them for example in East Asia (wearing masks when sick, not shaking hands), may not only be a short-term phenomenon, but will become commonplace in Germany as well.

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References

Abay, K. A. & Ibrahim, H. (2020), Winners and Losers from COVID-19: Evidence from Google Search Data for Egypt. MENA Policy Notes 8, International Food Policy Research Institute.

Alsayali, M., Abdulrashid, O. A., Ibrahim, A., Al-Osaimi, M. M., Dashash, N. A. & Al-Raddadi, R. (2020), 'Predictors of Adopting Precautionary Practices in Saudi Community During COVID-19 Pandemic', *American Journal of Psychology* **2**(1), 17–25.

Baker, S. R., Farrokhnia, R., Meyer, S., Pagel, M. & Yannelis, C. (2020), How Does Household Spending Respond to an Epidemic? Consumption during the 2020 COVID-19 Pandemic. Becker Friedman Institute for Economics at the University of Chicago Working Paper No. 2020-30.

Balinska, M. & Rizzo, C. (2009), 'Behavioural Responses to Influenza Pandemics: What Do We Know?', *PLOS Currents* **RRN1037**.

Bertsch, C. (2020), 'Ergebnisse aus dem COVID-19 Snapshot Monitoring COSMO: Die psychologische Lage', **23**.

Brinkman, J. C. & Mangum, K. (2020), The Geography of Travel Behavior in the Early Phase of the COVID-19 Pandemic. Federal Reserve Bank of Philadelphia Working Paper 20-38.

Brough, R., Freedman, M. & Phillips, D. C. (2020), Understanding Socioeconomic Disparities in Travel Behavior during the COVID-19 Pandemic. University of California-Irvine Department of Economics Working Paper # 192007.

Campagnaro, R., de Oliveira Collet, G., Podadeiro de Andrade, M., da Silva Lopes Salles, J. P., de Lourdes Calvo Fracasso, M., Lopes Salles Scheffel, D., Salvatore Freitas, K. M. & Santin, G. C. (2020), 'COVID-19 Pandemic and Pediatric Dentistry: Fear, Eating Habits and Parent's Oral Health Perceptions', *Children and Youth Services Review* **118**(105469).

Goolsbee, A. & Syverson, C. (2020), Fear, Lockdown, and Diversion: Comparing Drivers of Pandemic Economic Decline 2020. NBER Working Paper #27432.

Hale, T., Angrist, N., Cameron-Blake, E., Hallas, L., Kira, B., Majumdar, S., Petherick, A., Phillips, T., Tatlow, H. & Webster, S. (2020), 'Oxford COVID-19 Government Response Tracker'.
URL: *https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker*

Knowles, K. A. & Olatunji, B. O. (2020), 'Anxiety and Safety Behavior Usage during the COVID-19 Pandemic: The Prospective Role of Contamination Fear', *Journal of Anxiety Disorders* **77**(102323).

Laato, S., Islam, A. N., Farooq, A. & Dhir, A. (2020), 'Unusual Purchasing Behavior during the Early Stages of the COVID-19 Pandemic: The Stimulus-Organism-Response Approach', *Journal of Retailing and Consumer Services* **57**(102224).

Leder, J., Pastukhov, A. & Schütz, A. (2020), 'Social Value Orientation, Subjective Effectiveness, Perceived Cost, and the Use of Protective Measures during the COVID-19 Pandemic in Germany', *Comprehensive Results in Social Psychology* p. doi: 10.1080/23743603.2020.1828850.

Mondada, L., Bänninger, J., Bouaouina, S. A., Camus, L., Gauthier, G., Häggi, P., Koda, M., Svensson, H. & Tekin, B. S. (2020), 'Human Sociality in the Times of the Covid-19 Pandemic: A Systematic Examination of Change in Greetings', *Journal of Sociolinguistics* (00), 1–28.

Nederhof, A. J. (1985), 'Methods of Coping with Social Desirability Bias: A Review', *European journal of social psychology* **15**(3), 263–280.

Olson, E. (2006), 'Better Not Miss the Buss', *New York Times* pp. https://www.nytimes.com/2006/04/06/fashion/thursdaystyles/better–not–miss–the–buss.html.

Oxlund, B. (2020), 'An Anthropology of the Handshake', *Anthropology Now* **12**(1), 39–44.

Rieger, M. O. (2020*a*), 'COVID-19 conspiracy beliefs among students in China and Germany – causes and effects', *Working Paper* .

Rieger, M. O. (2020*b*), 'To wear or not to wear? factors influencing wearing face masks in Germany during the covid-19 pandemic', *Social Health and Behavior* **3**(2), 50.

Rieger, M. O. & He-Ulbricht, Y. (2020), 'German and Chinese dataset on attitudes regarding COVID-19 policies, perception of the crisis, and belief in conspiracy theories', *Data in Brief* p. 106384.

Rieger, M. O. & Wang, M. (2020), 'Secret Erosion of the "Lockdown"? Patterns in Daily Activities during the SARS-Cov2 Pandemic around the World', *Review of Behavioral Economics* **7**, 223–235.

Schulze, K., Bock, N., Dittmer, C., Flörchinger, V., Lorenz, D. F., Merkes, S. T. & Voss, M. (2020), Die SARS-CoV2-Pandemie aus Sicht der Bevölkerung. Katastrophenforschungsstelle Working Paper Nr. 16.

Sklansky, M., Nadkarni, N. & Ramirez-Avila, L. (2014), 'Banning the Handshake from the Health Care Setting', *JAMA* **311**(24), 2477–2478.

Swami, V. & Barron, D. (2020), 'Analytic Thinking, Rejection of Coronavirus (COVID-19) Conspiracy Theories, and Compliance with Mandated Social-Distancing: Direct and Indirect Relationships in a Nationally Representative Sample of Adults in the United Kingdom'.

Vieten, U. M. (2020), 'The "New Normal" and "Pandemic Populism" The COVID-19 Crisis and Anti-Hygienic Mobilisation of the Far-Right', *Social Sciences* **9**(9), 165.

World Health Organization, W. (2020), Timeline of WHO's response to COVID-19. last updated September 9, 2020, last accessed November 10, 2020.