What strikes the eye: How point-of-use reminders can increase compliance with COVID-19 measures

Frauke von Bieberstein[*], Anna-Corinna Kulle [†], Stefanie Schumacher [‡§]

Institute of Organization and Human Resource Management, University of Bern,

Engehaldenstrasse 4, 3012 Bern, Switzerland

Abstract

Increased hand hygiene is one of the new behavioral routines advocated globally to contain COVID-19. However, learning new routines is difficult. In a field experiment conducted in cooperation with a Swiss supermarket chain, we examine the effectiveness of point-of-use reminders placed directly at a hand disinfection station. The two experimental treatments feature a life-sized cardboard figure holding a "thank-you" sign. One treatment displayed a young woman who may be an effective reminder due to high salience and/or high perceived attractiveness. The other treatment featured an older woman who could entail a surprise effect and be perceived as more authentic due to her higher vulnerability to COVID-19. With the young figure, hand disinfection rates increase by 3.3 percentage points compared to the control treatment. In contrast, we do not find a significant effect of the older figure. Supplementary survey data allow us to explore potential mechanisms behind the results. The findings suggest ways to increase compliant behavior during the COVID-19 pandemic and beyond.

JEL classification: C93; D9; I12

Keywords: COVID-19; hand hygiene; compliance; reminders; field experiments

[*]Corresponding author, frauke.vonbieberstein@iop.unibe.ch

[†]anna-corinna.kulle@iop.unibe.ch

[‡]stefanie.schumacher@iop.unibe.ch

[§]The data of this field experiment was collected in collaboration with our partner. We thank our partner and its involved employees to have enabled this study. We further thank Lorenz Affolter, Daniel Frey, Nicolas Hafner, Greta Ingendaay, Saskia Oetterli, Aarusza Ramachandran, Laura Sennhauser, and Fredrik Sitje for collecting the data and for providing excellent research assistance. All errors are ours.

1 Introduction

The COVID-19 pandemic has had severe consequences for people's health, social lives, and on economies around the globe.[1] In an attempt to contain the spread of the novel coronavirus, many governments recommended new behavioral routines, such as increased hand hygiene and social distancing. However, researchers have shown that learning new routines is difficult and for some people, completely unsuccessful (Arias, 2015; DellaVigna, 2009; Rabin, 1998). Thus, two important questions arise: How can compliance with new COVID-19-related routines be improved? And how can we measure it?

One way to improve compliance with new behavior routines is to employ reminders that are given close to the point-of-use. As limited attention leads individuals to focus on only the most salient aspects of an environment (Bordalo et al., 2012; Kahneman et al., 1982), reminders can refocus attention and thus, be an effective tool to bridge the gap between originally intended behavior and actual behavior (see, e.g., Karlan et al. 2016).

Regarding compliance measurement, most previous research on COVID-19-related behavior relied on self-reported measures. The advantages are that they can be easily collected online for a large sample at a comparatively low cost. However, reported intentions may not necessarily translate into actions (Ajzen et al., 2009), and self-reported actions may be over-reported due to social desirability biases (Edwards, 1957). Researchers have recently cast some doubt on the reliability of self-reports on compliance with COVID-19-related measures. For instance, Falco and Zaccagni (2020) find that reminders increase self-reported intentions of staying at home, but not subsequent self-reported behavior. In addition, Hansen et al. (2021) find that self-reports of hygiene behaviors are significantly affected by irrelevant anchors. Furthermore, Daoust et al. (2020) show that reported non-compliance with COVID-19 measures increases when the social norm to comply is softened.

This study reports results from a field experiment conducted in July 2020 in stores of a supermarket chain in Switzerland (N = 14,152). Four months earlier, the Swiss government had issued a regulation for all open stores, which required that they provide hand disinfection dispensers at their entrances (FOPH, 2020).[2] In the experiment, unobtrusive observers manually captured customers' disinfection behavior by gender and age group, recording the behavior of all customers shopping at the respective stores on the respective days. We find that in the control treatment 58.5 percent of customers disinfect their hands. We designed two experimental treatments to remind customers at the point-of-use to disinfect their hands when entering the store. Both treatments featured a life-sized cardboard figure, placed next to the hand disinfection station, holding a sign with the

[1] In 2020 alone, more than 1.8 million people worldwide died from COVID-19 or COVID-19 complications (Worldometer, 2021). The pandemic further triggered the deepest economic recession in nearly a century (OECD, 2021).

[2] The effectiveness of hand disinfectant in restricting the transmission of COVID-19 and other viruses has been shown in several studies (Leslie et al., 2021; Pradhan et al., 2020; Aiello et al., 2010). Therefore, hand hygiene is widely considered to be among the easiest and most effective means for containing such diseases in various settings (see e.g. Gould et al., 2017; Haas and Larson,2007.). Thus, recommendations for increased hand hygiene have also been put forward by the World Health Organization (WHO) and national centers for disease control and prevention (CDC, 2021; WHO, 2021; FOPH, 2021).

message "A big thank-you for disinfecting your hands". One treatment featured a young woman (late 20s) and the other one an older woman (mid-60s). A young figure could be a better reminder due to higher salience or higher perceived attractiveness. For similar reasons, many marketing campaigns employ young protagonists. However, seeing the older figure could be surprising and thus, catch customers' attention. In addition, given that older people's health is more severely threatened by COVID-19, the older figure's message may be perceived as more authentic, and the person displayed as more in need of help, thus increasing compliance. We find a significant effect of the young figure, where hand disinfection rates increase by 3.3 percentage points compared to the control treatment. In contrast, in the treatment with the older figure, the difference compared to the control treatment is only 1.0 percentage point and not significant.

To better understand potential mechanisms behind the results, we conducted a survey among 420 customers of the supermarket chain. In the survey, participants assessed the two women displayed in the treatments on salience, attractiveness, friendliness, and need of protection from COVID-19, and they estimated the two women's ages. We find that the young woman displayed in the *T-young figure* treatment is perceived as significantly more salient and as significantly more attractive, which may explain the higher disinfection rates in this treatment. As the older woman is perceived as friendlier and is correctly perceived as in more need of protection from COVID-19, these characteristics cannot explain the results.

A fast-growing body of recent literature examines drivers of compliance with COVID-19-related measures. For instance, presidential messages affect the stated likelihood of wearing a mask (Cherry et al., 2021), narrative public health messages affect intentions to practice social distancing (Lunn et al., 2020), and inducing empathy for people most vulnerable to COVID-19 increases intentions to comply with recommended behaviors. Our study makes several important contributions. First, in contrast to most previous research, we are able to observe peoples' actual behavior. Second, we show the effect of a new type of reminder, that is, a life-sized cardboard figure, on compliance. Third, by comparing the two treatments and building on the results of the survey, we are able to suggest potential mechanisms underlying the higher effectiveness of the young figure. Finally, we add to the general literature on reminders by showing their effectiveness in an area—the entrance of a supermarket—loaded with different stimuli competing for visitors' attention (e.g., discount advertisements, new and fresh products on display, and other customers).

The results also have important practical implications. The "right" point-of-use reminder can offer an easy and cost-effective way to increase compliance. Given the high number of shoppers, the increase in the disinfection rate by 3.3 percentage points that we find will translate into thousands of additional pairs of clean and safe hands, if the supermarket chain rolls this campaign out across Switzerland. The results of the treatments combined with the survey also suggest that physical attractiveness and higher salience are more important when designing a reminder compared to higher perceived vulnerability.

The remainder of the paper is structured as follows: In Section 2, we outline the relevant literature. In Section 3, we describe the field setting, the experimental design, the sample's characteristics, and

randomization checks. In Section 4, we present the experimental results, in Section 5, we describe the survey and present its results, and in Section 6, we discuss the results and conclude.

2 Literature review

2.1 Compliance and COVID-19

During the course of the pandemic, various surveys and interviews were conducted that indicate a high willingness of the population to comply with given measures (Wang et al., 2021; Barari et al., 2020; Galasso et al., 2020). For example, Galasso et al. (2020) find intended compliance rates of between at least 80 and 90 percent in a large sample from eight OECD countries. However, researchers investigating compliance in other fields such as patient behavior suggest that actual behavior often falls short of intentions, reflecting a tendency to overestimate one's own readiness to perform (socially) desirable behaviors (Ajzen et al., 2009; Stone et al., 2003). Recent studies on compliance in the context of COVID-19 indicate a similar pattern (Daoust et al., 2020; Falco and Zaccagni, 2020).

The main reasons for non-compliance are a lack of awareness of the regulation or recommendation, taking a conscious decision, or forgetfulness. At the time of the present study (July 2020), educational strategies highlighting the need for hand disinfection had been widely used by the Swiss government, informing and establishing the descriptive norm to disinfect one's hands before entering a store. Recent studies in other countries show that such educational and informational interventions had some effect in raising compliance intentions (Mendolia et al., 2021). Education strategies are most effective in increasing compliance of consciously non-compliant individuals or those who are unaware of a recommendation, but behavioral strategies, such as reminders, can best address unintentional non-compliance caused by forgetfulness (Morris and Schulz, 1992).

A growing body of behavioral research has tested different messages and reminders to increase compliance with COVID-19 regulations and recommendations. The results are mixed. For instance, messages from political leaders supporting the recommendations (Cherry et al., 2021), empathy-inducing messages (Pfattheicher et al., 2020), public health messages telling a narrative (Lunn et al., 2020), and reminders making the pandemic salient (Cappelen et al., 2021) have been shown to increase compliance intentions. In contrast, studies testing the effect of messages making social externalities salient (Barari et al., 2020), messages with different justifications for compliance (Everett et al., 2020), social norms and pledging (Arroyos-Calvera et al., 2021), and varied messengers (leader vs. civilian) (Everett et al., 2020) were not able to find significant differences. Potential reasons for the mixed results could be that all of these studies rely on self-reported intentions or behavior, and that the overall high levels of intended compliance lead to ceiling effects.

Previous hand hygiene studies, mostly conducted in healthcare settings, tested different types of interventions to increase hand hygiene, such as greater availability of hand disinfectant, education,

written and verbal reminders, performance feedback, or observation. A meta-analysis shows that especially visibility (i.e., salience) and availability of hand hygiene stations can increase compliance (Gould et al., 2017).

2.2 Reminders and messengers

In the present study we use reminders as a means of directing recipients' limited attention to a particular behavior that might otherwise be forgotten. Reminders have been shown to affect behavior in many different settings, such as gym attendance (Calzolari and Nardotto, 2016), health prevention (Altmann and Traxler, 2014), compliance with administrative rules (Apesteguia et al., 2013), and saving and investment decisions (Karlan et al., 2016; Stango and Zinman, 2014).

In the study setting, we employed point-of-use reminders that were given directly when the desired behavioral change should take place. Point-of-use reminders have been successfully applied in several healthcare contexts, including hand disinfection (Vander Weg et al., 2019; Reisinger et al., 2014; Zheng et al., 2005), as well as in other domains, such as sustainability (Essl et al., 2020). In a context similar to COVID-19, the 2009–2010 H1N1 pandemic, written point-of-use reminders significantly increased the use of public hand sanitizers (Updegraff et al., 2011).

Reminders can work if they direct individuals' limited attention to the desired behavior. Thus, a prerequisite for an effective reminder is that it is salient enough to catch an individual's attention. The human mind focuses on elements that are odd, different, or unusual (Kahneman, 2011) and overweighs these elements in making decisions (Bordalo et al., 2016; Conty et al., 2016). The cardboard figures of the experiment in the present study represent novel elements that are different, unusual, and due to their size, large enough to potentially achieve high salience in supermarket entrance areas.

In the two point-of-use reminder treatments, we varied the age of the person displayed in the cardboard figure. The first cardboard figure treatment featured a young woman (late 20s), the second an older woman (mid-60s). A young woman represents the typical idealized young and attractive messenger. This type of messenger may work best, as fundamental research has shown that idealized messengers are most effective regarding, for example, opinion change or recall (Joseph, 1982; Baker and Churchill Jr., 1977). Researchers have also shown that attractiveness and age are negatively correlated (Mathes et al., 1985), and that attractive messengers are more liked, which leads to a more positive evaluation of the communicator's message (Joseph, 1982). In addition, attractiveness in itself can increase salience, as studies have shown that people not only look longer at attractive faces but also that covert attention for attractive individuals is higher and that beliefs on attractiveness are formed quickly, biasing subsequent cognitive processes (Sui and Liu, 2009; Olson and Marshuetz, 2005).

The second treatment featured an older woman (mid-60s) who can be regarded as a non-idealized messenger. Starting with the Unilever Dove campaign in 2004 (Murray, 2013), using non-idealized

models has become a trend in marketing campaigns. However, relatively little is known about the effectiveness of these unconventional messengers (Antioco et al., 2012). In the context of the COVID-19 pandemic, several companies and governments used older people as messengers in appeals to the population for compliance with COVID-19 safety measures (e.g., the Katjes out-of-home campaign (NRZ, 2020), or the social media campaigns of 'Resolve to Save Lives' and 'Vital Strategies' (PreventEpidemics, 2020). The treatment featuring an older woman may increase hand disinfection behavior most, as in the context of the pandemic, the salience of an older person may be higher than that of a young person. As the older woman is more affected by, and more in need of protection from, COVID-19, her message may be perceived as more authentic than the same message coming from a young person. Therefore, the older woman may make the morality of the action more salient (Capraro et al., 2019), and may be a more effective reminder of why the recommended behavior should be complied with. Further, the portrayed older woman may have higher salience for customers of the retail chain as she has a higher degree of novelty. Previously, the company used only idealized messengers in marketing and communication material, although the chain had not used life-sized cardboard figures thus far.

Finally, irrespective of the specific figure displayed, the so-called 'watching eyes effect' may decrease conscious non-compliance, as cues of being watched are known to influence a wide range of behaviors due to normative beliefs (Conty et al., 2016; Bateson et al., 2006). A previous study on hand hygiene compliance shows that compliance increases when an individual is watched (Pfattheicher et al., 2018).

3 Experimental design

3.1 Overall setup

As of March 2020, hand disinfection dispensers were installed in the entrance areas of all supermarkets in Switzerland to increase hand hygiene behaviors and thus, reduce the risk of spreading COVID-19. To investigate hand disinfection behavior before entering a supermarket, we designed a field experiment with two treatment conditions and one control condition. The ethical standard of the study was approved, and the experimental details were pre-registered.[3]

In both treatment conditions, a female life-sized cardboard figure, holding a sign with a 'thank-you' message for disinfecting one's hands, is placed next to the hand disinfection station at the entrance of a supermarket. The two treatment conditions vary in terms of the age of the person displayed, that is, either a young woman (*T-young figure*) or an older woman (*T-older figure*). The control

[3]The ethical standard was approved by the Faculty of Business Administration, Economics and Social Sciences of the University of Bern (June 3, 2020), serial number: 072020, and the experimental details were pre-registered with the American Economic Association's registry for randomized controlled trials with the unique identifying number AEARCTR- 0006033.

condition features the same hand disinfection station as the treatment conditions but without a cardboard figure (see Figure S1 in the Appendix for an illustration of the three conditions).

Data were collected in Switzerland in three stores of a supermarket chain on three consecutive days in July 2020, by recording the hand disinfection behavior of all customers entering the stores on these days (N = 14,152). The three treatments were randomized across the three days, three stores, and three daily time slots using an ABC/BCA/CAB-design approach (see Table 1 for the full randomization schedule).[4]

Table 1: Randomization schedule of the stores and time slots.

All time slots 3 hours each	Store 1	Store 2	Store 3
Day 1			
Morning	Control	T-older figure	T-young figure
Early afternoon	T-older figure	T-young figure	Control
Late afternoon/evening	T-young figure	Control	T-older figure
Day 2			
Morning	T-older figure	T-young figure	Control
Early afternoon	T-young figure	Control	T-older figure
Late afternoon/evening	Control	T-older figure	T-young figure
Day 3			
Morning	T-young figure	Control	T-older figure
Early afternoon	Control	T-older figure	T-young figure
Late afternoon/evening	T-older figure	T-young figure	Control

3.2 Implementation details

The three stores were selected for the experiment based on three criteria: average number of customers per day, low number of customers visiting the stores more than once during the workweek, and suitability for the experimental setup. First, with regard to the average number of customers per day, a range of 800 to 1400 customers was selected, based on the number of checkout transactions for a comparable week in May 2020.[5] This range was chosen to allow for a similar number of observations in all experimental stores and to ensure a sufficient number of observations, as well as a small enough number of customers per minute to allow accurate capturing of all incoming customers at any point in time. Several test runs were conducted to ensure the approximated maximum frequency was appropriate. Second, only stores with a low number of repeated customer visits during a workweek (Monday to Friday) were included, meaning historically, less than 5% of customers visited the store more than once during a workweek based on company data. Third, in terms of the experimental setup, stores eligible for selection must only have one entrance that is easy

[4]The randomization was done by rolling a dice at the office.

[5]This number is lower than the actual number of people visiting the store, as not every visitor makes a purchase (e.g., people shopping together or with children).

to observe with a minimum of invasiveness. From the list of eligible stores, three stores were chosen that were assessed as homogeneous as possible in terms of location and the sociodemographics of the customer base. Observations were collected from July 1 to July 3, 2020 (Wednesday to Friday). The week was chosen as the supermarket chain had assessed it to be a 'normal' week, without any special events, sales, holidays, or school vacations during that week or the previous or following week.

On each of the three observation days, data were collected from 8am to 7pm excluding in total two hours of breaks between the conditions and for lunch. The experimental conditions were swapped according to the randomization schedule (see Table 1 and Table S1 in the Appendix for a detailed day schedule) at the beginning of a break. For each time slot, there was one unobtrusive observer at each supermarket. The observers were situated at least 5–10 meters from the hand disinfection station and hidden at an unused cash desk or the customer service registry, or observed the live video footage in the security room. Hand disinfection behavior was captured manually, differentiating by gender and age group. Observers made direct estimations of both characteristics that were recorded immediately on paper (see Figure S2 in the Appendix for a sample sheet). Gender was captured as a control variable, as COVID-19-related survey data from Switzerland and other OECD countries show that women are more likely to see the virus as a serious health problem and to agree and comply with related behavioral recommendations (Galasso et al., 2020; Nivette et al., 2021). This is in line with previous studies that have shown women believe the seriousness of contagious viruses more than men, have stronger hand hygiene knowledge and behavior, and generally show better preventive health behavior than men (Suen et al., 2019; Hiller et al., 2017; Moran and Valle, 2016; Anderson et al., 2008; Ek, 2015). Additionally, age was included as a control variable, as older age seems to be associated with higher intended compliance, as well as with perceiving higher risks of dying if contracting COVID-19, but at the same time, a lower perceived risk of getting infected (Bruine de Bruin, 2021; Wang et al., 2021), potentially because of more compliant behavior.

3.3 The sample

In total, the behavior of 14,152 customers was captured in the experiment. Estimated age groups were divided into four categories: youth (12–17 years), adult (18–59 years), golden (60–74 years), and old (75+ years). Children who were estimated to be younger than 12 years of age were not captured, as their behavior might be strongly influenced by the accompanying adults. The split between the golden and old age groups was chosen as the old age group reflects the age group with the highest risk of severe consequences from a COVID-19 infection as assessed by the Swiss Federal Office of Public Health and the Swiss Ethics Committee and based on historic COVID-19 hospitalization data (>15% hospitalized cases) (FOPH and EKIF, 2020). The golden age group also has a higher risk of severe consequences from an infection than the two younger age groups (>4% hospitalized cases (FOPH and EKIF, 2020)) and therefore, is regarded as the secondary age risk group. Additionally, data regarding the store, day, time slot, hour, and observer were captured.

As shown in Table S2 in the Appendix, customers are evenly split across the three experimental conditions with approximately 34.0% in the control condition, 32.3% in *T-young figure*, and 33.7% in *T-older figure*. The randomization of gender across the three experimental conditions was successful, with a share of women between approximately 63% and 65% in all three conditions (the differences are not significant; see Table S2 in the Appendix). The age groups are also fairly evenly distributed across the three conditions with a share of 4.1–4.9% in the youth age group, 58.8–61.2% in the adult age group, 28.1–32.5% in the golden age group, and 4.1–6.7% in the old age group (see Table S2 in the Appendix). Due to the split in four age groups, and thus, a lower number of observations in each group, some of these differences are significant; however, the distributions remain similar in all three treatments.

4 Experimental results

4.1 Main treatment effects

In this section, we examine the influence of the two different point-of-use reminders on disinfecting one's hands before entering a supermarket store. In the control treatment, 58.5% of customers disinfect their hands. Customers in *T-young figure* have a disinfection rate of 61.7% and thus, are 3.3 percentage points more likely to disinfect their hands at the entrance than customers in the control condition ($p<0.001$, chi2 test).[6] In contrast, customers in *T-older figure* have a disinfection rate of 59.5%, 1.0 percentage point higher than the hand disinfection rate for those in the control condition, and this effect is not significant ($p = 0.311$, chi2 test). Comparing the *T-young figure* rate to the *T-older figure* rate shows that the disinfection rate in the former treatment is significantly higher (+2.3 percentage points, $p = 0.025$, chi2 test).

To verify the robustness of the results, we estimate several regression models (see Table 2). All models show a significant effect of the *T-young figure* on hand disinfection rates. The magnitude of the effect remains stable when controlling for gender (Model 2), age (Model 3), weekday (Model 4), or store (Model 5). In addition to the significant treatment effect observed for *T-young figure*, Model 2 shows that there is a significant gender difference, with women having, on average, an 8.6 percentage point higher hand disinfection rate than men ($p<0.001$). With regard to age, there is an increase in hand disinfection rates with older age, from the youth (37.0%) to the adult (54.8%) and the golden (70.7%) to the old (75.1%) age groups, as captured in Model 3. The gender and age differences are in line with a larger observational study on hand disinfection behavior in Swiss supermarkets (see von Bieberstein et al. 2021). There are also significant differences between weekdays and stores (Models 4 and 5). In all models, the treatment effect is highly significant. Moreover, when logistic regression models are run, the results are robust with a stable effect size (see Table S3 in the Appendix).

[6] All statistical tests are two-sided.

Gender differences in the reaction to the treatment could be present, as men and women might react differently to a young vs. an older female figure. Similarly, the reaction might depend on the customer's age. Thus, in the following we examine gender and age group differences in more detail.

Table 2: Hand disinfection behavior, models 1–5.

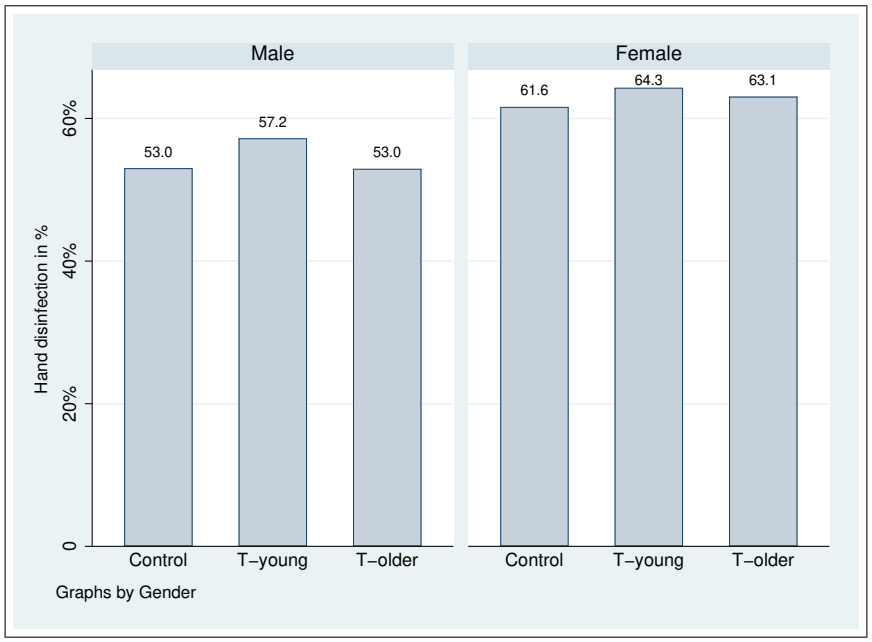
	Disinfected (1)	Disinfected (2)	Disinfected (3)	Disinfected (4)	Disinfected (5)
T-young figure	0.033***	0.032***	0.034***	0.033***	0.032***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
T-older figure	0.010	0.009	0.010	0.011	0.011
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Female		0.086***	0.076***	0.075***	0.079***
		(0.009)	(0.009)	(0.009)	(0.008)
Age adult			0.181***	0.174***	0.184***
			(0.020)	(0.020)	(0.020)
Age golden			0.336***	0.331***	0.345***
			(0.020)	(0.020)	(0.021)
Age old			0.373***	0.372***	0.406***
			(0.025)	(0.025)	(0.025)
Thursday				0.043***	0.042***
				(0.010)	(0.010)
Friday				0.033***	0.031***
				(0.010)	(0.010)
Store_2					-0.090***
					(0.010)
Store_3					-0.007
					(0.010)
Constant	0.585***	0.530***	0.306***	0.287***	0.309***
	(0.007)	(0.009)	(0.021)	(0.021)	(0.022)
Observations	14,152	14,152	14,152	14,152	14,152
r2	0.001	0.008	0.043	0.044	0.051

Notes: The table presents estimates from ordinary least squares [OLS] regressions. Robust standard errors are in parentheses. Significance levels: *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

4.2 Gender differences

Figure 1 shows the disinfection rates by treatment and gender. In *T-young figure*, disinfection rates are significantly higher than in the control condition for both genders (p = 0.014 for men and p = 0.032 for women). Although the effect size is larger for men (4.2 percentage points) than for women (2.7 percentage points), this difference is not significant. For both genders, there is no significant difference between *T-older figure* and the control treatment. For men, there is a significant difference of 4.3 percentage points (p = 0.013, chi2 test) between *T-young figure* and *T-older figure*. For women, this difference is 1.3 percentage points and not significant (p = 0.31, chi2 test).

FIGURE 1: Hand disinfection rates by treatment and gender.



	p-value control vs. T-young	p-value control vs. T-older	p-value T-young vs. T-older
Male	0.014	0.958	0.013
Female	0.032	0.245	0.314

Notes: The table shows p-values from two-sided chi-square tests.

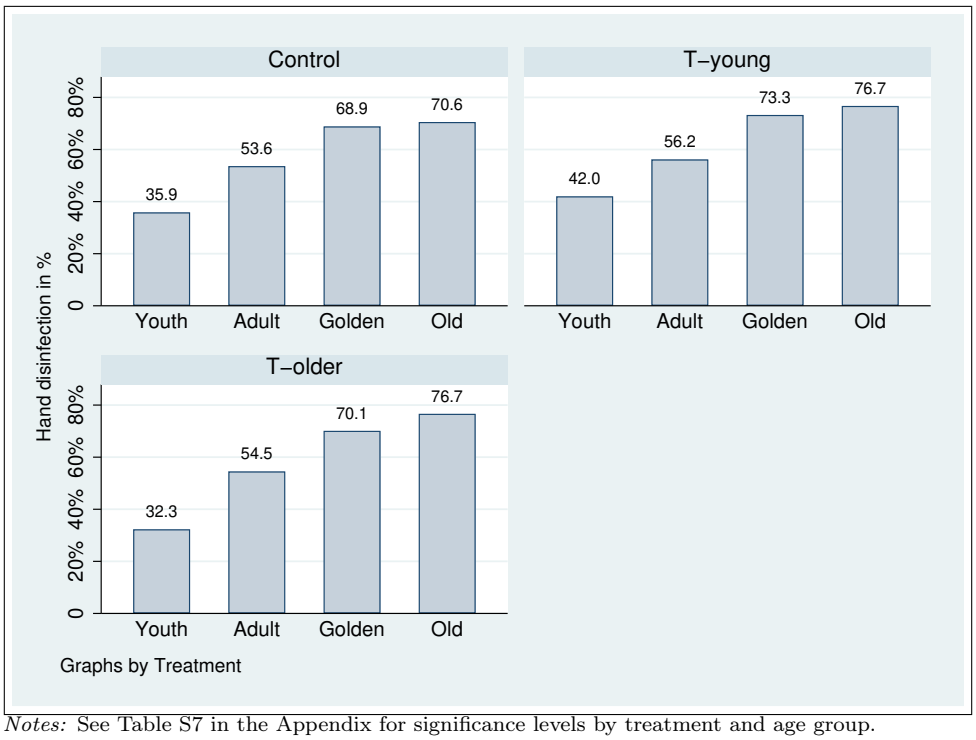
For both genders, the effect of *T-young figure* compared to the control treatment is robust when multiple regression models are run (see Tables S4 and S5 in the Appendix). For men, the effect size remains stable between 4.1 and 4.2 percentage points when controlling for age, weekday, and store. For women, the effect size is between 2.5 and 2.9 percentage points across all models.

4.3 Age differences

As illustrated in Figure 2, there is an increase in hand disinfection behavior across age groups in all treatments. Hand disinfection rates in *T-young figure* are higher than in the control condition across all age groups (+6.2 percentage points for the youth age group, +2.6 percentage point for the adult age group, +4.4 percentage points for the golden age group, and +6.2 percentage points for the old age group). The difference is significant in the adult ($p = 0.056$, chi2 test) and golden ($p = 0.009$, chi2 test) age groups. *T-older figure* does not have significantly higher rates than the control treatment in any age group. Except for the oldest age group (old, 75+ years), *T-young figure* also has higher disinfection rates than *T-older figure*. The difference is significant for the youth ($p = 0.040$, chi2 test) and marginally significant for the golden ($p = 0.069$, chi2 test) age groups.

Splitting age groups by gender shows that disinfection rates are highest in *T-young figure* for all age-gender groups (see Table S6 in the Appendix for a complete overview).

FIGURE 2: Hand disinfection rates by treatment and age group.



Notes: See Table S7 in the Appendix for significance levels by treatment and age group.

5 The survey

5.1 Survey design

To understand potential mechanisms behind the results, we conducted a survey to investigate differences in the assessment of the displayed young figure vs. the older figure. The survey was part of a larger online survey study on COVID-19 conducted in November 2020, with 420 customers of the supermarket chain as participants in the cleaned sample.[7] All results were robust when the full sample was included. The survey was conducted by a professional market research agency in Switzerland, and participants were evenly split between the two gender and four age groups as

[7]Participants were pre-screened on being customers of the supermarket chain and on not having been previously infected or thinking that they had been infected with COVID-19. The full sample of 466 participants was then cleaned based on a minimum duration of three minutes to complete the full survey and a minimum duration of 10 seconds to answer long matrix questions. These minimum times were defined in test runs to ensure participants were able to read the questions and answers. The final sample also excluded participants with outliers in easy estimation questions, as it can also be assumed that these questions were not read properly. In total, 46 participants were excluded from the full sample (<10%), which is in line with the average cleaning rate of the professional market research agency that conducted the survey.

defined in the field experiment (eight subgroups with approximately 50 participants each). Within the adult age group (18–59 years), participants were evenly distributed across 10-year intervals of the age range (see Table S8 in the Appendix for a descriptive overview of the sample). The full survey took about 7min to complete and participants received a fixed payment of CHF 1.40 for their participation.

As part of the survey, participants saw images of both women as depicted in the cardboard figures and were then asked to rate the two figures on several characteristics to understand potential mechanisms of *T-young figure* being more effective than *T-older figure*. Which woman was displayed first was randomly assigned. Images of both figures were rated on their respective salience, attractiveness, friendliness, and need for protection from COVID-19. For all questions, respondents were asked to express their ratings on a scale from 0 to 10 (see Figure S3 in the Appendix for the survey questions). To check whether the age differentiation worked, participants were also asked to estimate each figure's approximate age. The four characteristics for assessment were chosen, as they may all have had an impact on a differentiated effect of *T-young figure* vs. *T-older figure*.

First, as discussed in sections 1 and 2, salience could be an important differentiator, as compliance with the message can be achieved only if the messenger holding the message is noticed. This is particularly important in the supermarket entrance setting, as in this area, many other stimuli are present (e.g., products behind the entrance can be seen, other customers are present, other signs are on display). Thus, participants were asked to assess how much they would notice each person in a crowded area.

Second, attractiveness may be a relevant differentiator, as attractiveness leads to a more positive assessment of an individual on several characteristics (Dion, 1972) and can lead individuals to assess the message as more important (Puckett et al., 1983). Experimental evidence suggests that attractive messengers have a positive impact on the message they are associated with and therefore, may make disinfecting one's hands more appealing (Joseph, 1982). In addition, attractiveness can make the person on display more distinctive, that is, salient, as covert attention appears to be higher for attractive individuals (Sui and Liu, 2009). Research also suggests that attractiveness generally decreases with age (Mathes et al., 1985; Wernick and Manaster, 1984). Consequently, participants were asked to rate each person in terms of attractiveness.

Third, perceived friendliness may have an effect, as customers may be more willing to comply with a message or request from someone who is perceived as being friendly. If a person sees another person as friendly, and thus, likes that person, the likelihood of complying with his or her request increases (Cialdini and Goldstein, 2004). Friendliness can also invoke reciprocity, with visitors reciprocating a friendly greeting at the entrance with compliance with the request to disinfect one's hands. Thus, participants were asked to assess how friendly they perceived the women depicted in the cardboard figures to be.

Finally, customers may be more likely to follow a request from a person for whom the requested compliance is more relevant. Therefore, customers were asked to assess the need for protection from

COVID-19 for the young person and the older person. This item could explain the direction of the results (higher disinfection rates in the *T-young figure* vs. the *T-older figure*) only if respondents incorrectly assessed that the risk of severe consequences and thus, the need for protection, was greater for the young person.

5.2 Survey results

The online survey results show that the age perception of the two women was as intended, and age differentiation was successful (see Table 3). The young figure is estimated to be, on average, 29 years old (SD = 5.7 years) and the older figure to be, on average, 64 years old (SD = 6.9 years). Thus, the young figure is perceived to be much younger than the older figure. There is no gender difference in the age perception of the young figure. The older figure is perceived as slightly older by men (64 years) than by women (63 years); however, this result is only weakly significant (p = 0.096, Mann-Whitney rank-sum test).

The results for the rated characteristics are displayed in Table 3. The woman depicted in *T-young figure* is perceived as significantly more attractive than the woman depicted in *T-older figure* (p<0.01, Wilcoxon signed-rank test). Additionally, *T-young figure* is assessed as 'standing out more in a crowd,' that is, is perceived to have higher salience in comparison to the older figure (p<0.01, Wilcoxon signed-rank test). In contrast to lower ratings for attractiveness and salience, the older figure is rated as slightly friendlier (p<0.01, Wilcoxon signed-rank test) and is correctly assessed as being significantly more in need of protection from COVID-19 than the young figure (p<0.01, Wilcoxon signed-rank test).

Table 3: Survey assessment of treatment figures overall and by gender.

	Overall T-older (1) n = 420	Overall T-young (2) n = 420	Men T-older (1a) n=203	Men T-young (2a) n = 203	Women T-older (1b) n = 217	Women T-young (2b) n = 217	p-value (1) vs. (2)	p-value (1a) vs. (2a)	p-value (1b) vs. (2b)	p-value (1a) vs. (1b)	p-value (2a) vs. (2b)
Attractiveness	5.77	7.23	5.32	7.37	6.2	7.1	<0.01	<0.01	<0.01	<0.01	0.52
Salience	4.93	5.87	4.81	6.18	5.04	5.59	<0.01	<0.01	<0.01	0.34	<0.01
Friendliness	8.29	7.9	8.08	8.06	8.48	7.76	<0.01	0.65	<0.01	<0.01	0.12
COVID-19 protection	8.45	7.5	8.38	7.6	8.5	7.4	<0.01	<0.01	<0.01	0.54	0.47
Age	64	29	64	29	63	29	<0.01	<0.01	<0.01	0.096	0.81

Notes: The table shows mean values of the overall sample and by gender. Two-sided Mann-Whitney tests are used for comparisons between gender groups, and two-sided Wilcoxon signed-rank tests are used for comparisons between treatments (T-young vs. T-older).

All results are robust when controlling for respondents' gender. For salience and attractiveness, the differences in assessments of the woman depicted in *T-young figure* compared to the woman depicted in *T-older figure*, that is, the effect sizes, are significantly greater for men than for women (salience, p = 0.027; attractiveness, p = 0.001; Mann-Whitney rank-sum test). Men further perceive the young figure as significantly more salient than women do (p<0.01, Mann-Whitney rank-sum test), and the older figure is viewed as significantly less attractive by men than by women (p<0.01, Mann-Whitney

rank-sum test). Regarding friendliness, both genders rate the older figure as friendlier, but this difference is significant only for women ($p<0.01$, Wilcoxon signed-rank test). Although the older figure is assessed as being significantly more in need of protection from COVID-19 by both genders ($p<0.01$, Wilcoxon signed-rank test), women assess the difference in the need for protection from COVID-19 between the two depicted women as greater than men do ($p = 0.180$).

All results for salience, attractiveness, friendliness, and need for COVID-19 protection also hold when controlling for age group. All age groups assess the woman depicted in *T-young figure* as significantly more attractive and as standing out more in a crowd (i.e., as having higher salience) ($p<0.01$, Wilcoxon signed-rank test). The need for COVID-19 protection is assessed as higher for the woman depicted in *T-older figure* across all age groups ($p<0.02$, Wilcoxon signed-rank test). In terms of friendliness, the youth and adult age groups assess the woman depicted in *T-older figure* as friendlier ($p<0.01$, Wilcoxon signed-rank test), while there is no significant difference for the golden and old age groups.

In terms of age groups, it can further be observed that the salience assessment of both depicted women increases with age group. Both women are assessed as most salient by the old age group (young-old, $p<0.01$; adult-old, $p<0.01$; golden-old, $p = 0.02$, Mann-Whitney rank-sum test). Regarding attractiveness, both women depicted in the treatments receive the highest ratings from the old age group (young-old, adult-old, golden-old $p<0.01$, Mann-Whitney rank-sum test). There are no notable differences in the assessments between age groups on friendliness and need for protection from COVID-19. Additional details of the survey assessment by age groups can be found in Table S9 in the Appendix.

5.3 Potential mechanisms

The survey results indicate potential mechanisms for the differences in hand disinfection rates between *T-young figure* and *T-older figure*. These differences might be driven by the higher perceived attractiveness of the woman depicted in *T-young figure*, as well as by the higher salience of the young woman. The assessed higher salience of the young figure may be a consequence of higher perceived attractiveness, or additional factors may be at play. The larger difference in the disinfection rates for men in *T-young figure* vs. *T-older figure* compared to those for women, although not significant (for the adult age group, $p = 0.13$), might be driven by men perceiving the differences in attractiveness and salience between the two figures as significantly greater than women do. Thus, men may be more compliant with disinfecting their hands in *T-young figure* because they notice the young woman more and/or as they want to 'please' the woman depicted more, as she is viewed as significantly more attractive.

A similar line of thought can explain the comparable hand disinfection rates of the old age group in both treatment conditions (*T-young figure* and *T-older figure*). In the survey, the old age group rates both women depicted in the two treatments much higher on salience and attractiveness than the other age groups do. The old age group's scores for attractiveness and salience for the older figure

are, for example, even higher than the scores of the youth and adult age groups of the young figure. Thus, the woman depicted in *T-older figure* may already pass a minimum threshold for attractiveness and salience in the old age group, so that individuals in this age group notice both women in a crowded area and/or want to 'please' both women depicted, leading to compliant behavior and explaining the similar disinfection rates for the treatments. Based on the survey data, the effect of the young figure cannot be related to perceptions of friendliness or skewed perceptions of need for protection from COVID-19.

6 Conclusion

Measures against COVID-19, such as increased hand hygiene, can only work if people comply with them. This study tested the effect of point-of-use reminders on hand disinfection behavior during the COVID-19 pandemic in Switzerland. Learning new routines is difficult, and people might simply forget to disinfect their hands. In a field experiment with a supermarket chain, we tested two reminders in the form of life-sized cardboard figures, differing in the age of the women displayed. We find that the reminder with the young figure increases hand disinfection rates significantly, compared to the control condition and compared to the reminder with the older figure. The increase is greater for men than for women; however, this gender difference is not significant. The reminder with the older figure does not increase hand disinfection rates significantly compared to the control condition.

Survey data reveal that the young figure is perceived to be significantly more salient and more attractive than the older figure. Perceived friendliness and perceived need for protection from COVID-19 do not seem to have an effect on the results, as both figures are rated with high levels of friendliness, and the older figure is perceived as even friendlier. The older figure is also rated as significantly more in need of protection from COVID-19.

As the young figure is assessed as significantly more salient, the older figure may not pass the salience threshold to be noticed by visitors. As previous research has shown, attractive individuals might receive more attention (Sui and Liu, 2009). In addition, attractiveness could also increase the level of individual willingness to comply (Baker and Churchill Jr., 1977). The fact that the older figure does not lead to higher disinfection rates than the control condition is somewhat surprising, as the treatment still represents a physically large reminder in the field of vision before entering one of the supermarkets of this experiment. However, the salience and attractiveness of the depicted older woman appear to have been below a necessary threshold to capture sufficient attention and/or willingness to act. Other stimuli in the supermarkets' entrance areas (e.g., advertisements, product displays) may have been more salient, capturing incoming visitors' attention and thus, distracting them from the recommended action to disinfect their hands.

Taking the results together, those for *T-young figure* show that a point-of-use reminder can be an effective tool for increasing compliance, even in an already stimuli-loaded environment. The findings,

however, point out the importance of making a point-of-use reminder salient and suggest that if choosing a messenger, its attractiveness plays a critical role.

For this field experiment, the supermarkets were selected to be as homogeneous as possible; thus, we cannot examine potential differing effects based on sociodemographic factors such as income or urbanity. Future research would benefit from analyzing a more heterogeneous sample to derive potential differences. In addition, it would be interesting to test the long-term effect of these point-of-use reminders. Researchers have shown that reminders can work even if they are regularly repeated (Calzolari and Nardotto, 2016). Finally, as the data of this field experiment show, treatments designed to increase hand disinfection rates especially in men and young people (12–17 years) could further advance research and improve public health.

References

Aiello, A. E., Murray, G. F., Perez, V., Coulborn, R. M., Davis, B. M., Uddin, M., Shay, D. K., Waterman, S. H., and Monto, A. S. (2010). Mask use, hand hygiene, and seasonal influenza-like illness among young adults: A randomized intervention trial. *The Journal of Infectious Diseases*, 201(4):491–498.

Ajzen, I., Czasch, C., and Flood, M. G. (2009). From intentions to behavior: Implementation intention, commitment, and conscientiousness. *Journal of Applied Social Psychology*, 39(6):1356–1372.

Altmann, S. and Traxler, C. (2014). Nudges at the dentist. *European Economic Review*, 72:19–38.

Anderson, J. L., Warren, C. A., Perez, E., Louis, R. I., Phillips, S., Wheeler, J., Cole, M., and Misra, R. (2008). Gender and ethnic differences in hand hygiene practices among college students. *American Journal of Infection Control*, 36(5):361–368.

Antioco, M., Smesters, D., and Le Boedec, A. (2012). Take your pick: Kate Moss or the girl next door? The effectiveness of cosmetics advertising. *Journal of Advertising Research*, 52(1):15–30.

Apesteguia, J., Funk, P., and Iriberri, N. (2013). Promoting rule compliance in daily-life: Evidence from a randomized field experiment in the public libraries of Barcelona. *European Economic Review*, 64:266–284.

Arias, A. (2015). Understanding and managing compliance in the nature conservation context. *Journal of Environmental Management*, 153:134–143.

Arroyos-Calvera, D., Drouvelis, M., Lohse, J., and McDonald, R. (2021). Improving compliance with COVID-19 guidance: A workplace field experiment. *Working Paper, available at SSRN*.

Baker, M. J. and Churchill Jr., G. A. (1977). The impact of physically attractive models on advertising evaluations. *Journal of Marketing Research (JMR)*, 14(4):538–555.

Barari, S., Caria, S., Davola, A., Falco, P., Fetzer, T., Fiorin, S., Hensel, L., Ivchenko, A., Jachimowicz, J., and King, G. (2020). Evaluating COVID-19 public health messaging in Italy: Self-reported compliance and growing mental health concerns. *MedRxiv*.

Bateson, M., Nettle, D., and Roberts, G. (2006). Cues of being watched enhance cooperation in a real-world setting. *Biology Letters*, 2(3):412–414.

Bordalo, P., Gennaioli, N., and Shleifer, A. (2012). Salience theory of choice under risk. *The Quarterly Journal of Economics*, 127(3):1243–1285.

Bordalo, P., Gennaioli, N., and Shleifer, A. (2016). Competition for attention. *The Review of Economic Studies*, 83(2):481–513.

Bruine de Bruin, W. (2021). Age differences in COVID-19 risk perceptions and mental health: Evidence from a national U.S. survey conducted in march 2020. *The Journals of Gerontology: Series B*, 76(2):e24–e29.

Calzolari, G. and Nardotto, M. (2016). Effective reminders. *Management Science*, 63(9):2915–2932.

Cappelen, A. W., Falch, R., Sørensen, E. , and Tungodden, B. (2021). Solidarity and fairness in times of crisis. *Journal of Economic Behavior & Organization*, 186:1–11.

Capraro, V., Jagfeld, G., Klein, R., Mul, M., and de Pol, I. v. (2019). Increasing altruistic and cooperative behaviour with simple moral nudges. *Scientific Reports*, 9(1):1–11.

CDC (2021). How to protect yourself & others. *URL: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html, last accessed 2021-05-10.*

Cherry, T. L., James, A. G., and Murphy, J. (2021). The impact of public health messaging and personal experience on the acceptance of mask wearing during the COVID-19 pandemic. *Journal of Economic Behavior & Organization*, 187:415–430.

Cialdini, R. B. and Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, 55(1):591–621.

Conty, L., George, N., and Hietanen, J. K. (2016). Watching eyes effects: When others meet the self. *Consciousness and Cognition*, 45:184–197.

Daoust, J.-F., Nadeau, R., Dassonneville, R., Lachapelle, E., Bélanger, , Savoie, J., and Linden, C. v. d. (2020). How to survey citizens' compliance with COVID-19 public health measures: Evidence from three survey experiments. *Journal of Experimental Political Science*, pages 1–8.

DellaVigna, S. (2009). Psychology and economics: Evidence from the field. *Journal of Economic Literature*, 47(2):315–72.

Dion, K. K. (1972). Physical attractiveness and evaluation of children's transgressions. *Journal of Personality and Social Psychology*, 24(2):207–213.

Edwards, A. L. (1957). *The Social Desirability Variable in Personality Assessment and Research.* Dryden Press, Ft Worth, TX, US.

Ek, S. (2015). Gender differences in health information behaviour: A Finnish population-based survey. *Health Promotion International*, 30(3):736–745.

Essl, A., Steffen, A., and Staehle, M. (2020). Choose to reuse! The effect of action-close reminders on pro-environmental behavior. *Working Paper.*

Everett, J. A., Colombatto, C., Chituc, V., Brady, W. J., and Crockett, M. (2020). The effectiveness of moral messages on public health behavioral intentions during the COVID-19 pandemic. *Working Paper.*

Falco, P. and Zaccagni, S. (2020). Promoting social distancing in a pandemic: Beyond the good intentions. *Working Paper, available at SSRN*.

FOPH (2020). Coronavirus: Protection plans. *URL: https://www.bag.admin.ch/bag/de/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/massnahmen-des-bundes/empfehlungen-fuer-die-arbeitswelt.html, last accessed 2021-06-02*.

FOPH (2021). Coronavirus: How we protect ourselves. *URL: https://www.bag.admin.ch/bag/de/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/so-schuetzen-wir-uns.html, last accessed 2021-05-12*.

FOPH and EKIF (2020). Covid-19 vaccination strategy. *URL: https://www.newsd.admin.ch/newsd/message/attachments/64533.pdf, last accessed 2021-06-18*.

Galasso, V., Pons, V., Profeta, P., Becher, M., Brouard, S., and Foucault, M. (2020). Gender differences in COVID-19 attitudes and behavior: Panel evidence from eight countries. *Proceedings of the National Academy of Sciences*, 117(44):27285–27291.

Gould, D. J., Moralejo, D., Drey, N., Chudleigh, J. H., and Taljaard, M. (2017). Interventions to improve hand hygiene compliance in patient care. *Cochrane Database of Systematic Reviews*, (9):1465–1858.

Haas, J. P. and Larson, E. L. (2007). Measurement of compliance with hand hygiene. *Journal of Hospital Infection*, 66(1):6–14.

Hansen, P. G., Larsen, E. G., and Gundersen, C. D. (2021). Reporting on one's behaviour: a survey experiment on the non-validity of self-reported COVID-19 hygiene relevant routine behaviours. *Behavioural Public Policy*, pages 1–35.

Hiller, J., Schatz, K., and Drexler, H. (2017). Gender influence on health and risk behavior in primary prevention: a systematic review. *Journal of Public Health*, 25(4):339–349.

Joseph, P. W. B. (1982). The credibility of physically attractive communicators: A review. *Journal of Advertising*, 11(3):15–24.

Kahneman, D. (2011). *Thinking, Fast and Slow*. Macmillan.

Kahneman, D., Slovic, S. P., Slovic, P., and Tversky, A. (1982). *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge University Press.

Karlan, D., McConnell, M., Mullainathan, S., and Zinman, J. (2016). Getting to the top of mind: How reminders increase saving. *Management Science*, 62(12):3393–3411.

Leslie, R. A., Zhou, S. S., and Macinga, D. R. (2021). Inactivation of SARS-CoV-2 by commercially available alcohol-based hand sanitizers. *American Journal of Infection Control*, 49(3):401–402.

Lunn, P. D., Timmons, S., Belton, C. A., Barjaková, M., Julienne, H., and Lavin, C. (2020). Motivating social distancing during the COVID-19 pandemic: An online experiment. *Social Science & Medicine*, 265:113478.

Mathes, E. W., Brennan, S. M., Haugen, P. M., and Rice, H. B. (1985). Ratings of physical attractiveness as a function of age. *Journal of Social Psychology*, 125(2):157–168.

Mendolia, S., Stavrunova, O., and Yerokhin, O. (2021). Determinants of the community mobility during the Covid-19 epidemic: The role of government regulations and information. *Journal of Economic Behavior & Organization*, 184:199–231.

Moran, K. R. and Valle, S. Y. D. (2016). A meta-analysis of the association between gender and protective behaviors in response to respiratory epidemics and pandemics. *PLOS ONE*, 11(10):e0164541.

Morris, L. S. and Schulz, R. M. (1992). Patient compliance—an overview. *Journal of Clinical Pharmacy and Therapeutics*, 17(5):283–295.

Murray, D. P. (2013). Branding "real" social change in dove's campaign for real beauty. *Feminist Media Studies*, 13(1):83–101.

Nivette, A., Ribeaud, D., Murray, A., Steinhoff, A., Bechtiger, L., Hepp, U., Shanahan, L., and Eisner, M. (2021). Non-compliance with COVID-19-related public health measures among young adults in Switzerland: Insights from a longitudinal cohort study. *Social Science & Medicine*, 268:113370.

NRZ (2020). Emmerich: Katjes richtet in neuer Kampagne Blick auf Ältere - In a new campaign Katjes focuses on the elderly. *URL: https://www.nrz.de/staedte/emmerich-rees-isselburg/emmerich-katjes-richtet-in-neuer-kampagne-blick-auf-aeltere-id229186462.html, last accessed 2021-04-14.*

OECD (2021). Focus on the global economy. *URL: https://www.oecd.org/coronavirus/en/themes/global-economy last accessed 2021-06-05.*

Olson, I. R. and Marshuetz, C. (2005). Facial attractiveness is appraised in a glance. *Emotion*, 5(4):498–502.

Pfattheicher, S., Nockur, L., Böhm, R., Sassenrath, C., and Petersen, M. B. (2020). The emotional path to action: Empathy promotes physical distancing and wearing of face masks during the COVID-19 pandemic. *Psychological Science*, 31(11):1363–1373.

Pfattheicher, S., Strauch, C., Diefenbacher, S., and Schnuerch, R. (2018). A field study on watching eyes and hand hygiene compliance in a public restroom. *Journal of Applied Social Psychology*, 48(4):188–194.

Pradhan, D., Biswasroy, P., Kumar Naik, P., Ghosh, G., and Rath, G. (2020). A review of current interventions for COVID-19 prevention. *Archives of Medical Research*, 51(5):363–374.

PreventEpidemics (2020). Be the one to prevent Covid-19. *URL: https://preventepidemics.org/covid19/us-response/campaigns/be-the-one/, last accessed 2021-05-31.*

Puckett, J. M., Petty, R. E., Cacioppo, J. T., and Fischer, D. L. (1983). The relative impact of age and attractiveness stereotypes on persuasion. *Journal of Gerontology*, 38(3):340–343.

Rabin, M. (1998). Psychology and economics. *Journal of Economic Literature*, 36(1):11–46.

Reisinger, H. S., Perencevich, E. N., Morgan, D. J., Forrest, G. N., Shardell, M., Schweizer, M. L., Graham, M. M., Franciscus, C. L., and Weg, M. W. V. (2014). Improving hand hygiene compliance with point-of-use reminder signs designed using theoretically grounded messages. *Infection Control & Hospital Epidemiology*, 35(5):593–594.

Stango, V. and Zinman, J. (2014). Limited and varying consumer attention: Evidence from shocks to the salience of bank overdraft fees. *The Review of Financial Studies*, 27(4):990–1030.

Stone, A. A., Shiffman, S., Schwartz, J. E., Broderick, J. E., and Hufford, M. R. (2003). Patient compliance with paper and electronic diaries. *Controlled Clinical Trials*, 24(2):182–199.

Suen, L. K., So, Z. Y., Yeung, S. K., Lo, K. Y., and Lam, S. C. (2019). Epidemiological investigation on hand hygiene knowledge and behaviour: A cross-sectional study on gender disparity. *BMC Public Health*, 19(1):1–14.

Sui, J. and Liu, C. H. (2009). Can beauty be ignored? Effects of facial attractiveness on covert attention. *Psychonomic Bulletin & Review*, 16(2):276–281.

Updegraff, J. A., Emanuel, A. S., Gallagher, K. M., and Steinman, C. T. (2011). Framing flu prevention - An experimental field test of signs promoting hand hygiene during the 2009–2010 H1N1 pandemic. *Health Psychology*, 30(3):295.

Vander Weg, M. W., Perencevich, E. N., O'Shea, A. M. J., Jones, M. P., Vaughan Sarrazin, M. S., Franciscus, C. L., Goedken, C. C., Baracco, G. J., Bradley, S. F., Cadena, J., Forrest, G. N., Gupta, K., Morgan, D. J., Rubin, M. A., Thurn, J., Bittner, M. J., and Reisinger, H. S. (2019). Effect of frequency of changing point-of-use reminder signs on health care worker hand hygiene adherence: A cluster randomized clinical trial. *JAMA Network Open*, 2(10):e1913823–e1913823.

von Bieberstein, F., Kulle, A.-C., and Schumacher, S. (2021). Gender and age differences in compliance with COVID-19 hygiene recommendations in Switzerland. *Working Paper.*

Wang, D., Marmo-Roman, S., Krase, K., and Phanord, L. (2021). Compliance with preventative measures during the COVID-19 pandemic in the USA and Canada: Results from an online survey. *Social Work in Health Care*, pages 1–16.

Wernick, M. and Manaster, G. J. (1984). Age and the perception of age and attractiveness. *The Gerontologist*, 24(4):408–414.

WHO (2021). Coronavirus disease (COVID-19): Advice for the public. *URL: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public, 2021-05-10*.

Worldometer (2021). Coronavirus death toll and trends - Worldometer. *URL: https://www.worldometers.info/coronavirus/coronavirus-death-toll/, last accessed 2021-04-14*.

Zheng, K., Padman, R., Johnson, M. P., and Diamond, H. S. (2005). Understanding technology adoption in clinical care: Clinician adoption behavior of a point-of-care reminder system. *International Journal of Medical Informatics*, 74(7):535–543.

Appendix A: Supplementary figures

FIGURE S1: Illustration of the three experimental conditions.

T-older figure | T-young figure | Control

Notes: Both signs read: "A big thank-you for disinfecting your hands".

FIGURE S2: Sample data collection sheet.

Place: Store 1 Date: Day 1 Capturerd by: Observer 1

	Disinfected: Yes							
	Female				Male			
	Youth 12 - 17 y	Adults 18 - 59 y	Golden ager 60 - 75 y	Old > 75 y	Youth 12 - 17 y	Adults 18 - 59 y	Golden ager 60 - 75 y	Old > 75 y
8:00-9:00								

	Disinfected: No							
	Female				Male			
	Youth 12 - 17 y	Adults 18 - 59 y	Golden ager 60 - 75 y	Old > 75 y	Youth 12 - 17 y	Adults 18 - 59 y	Golden ager 60 - 75 y	Old > 75 y
8:00-9:00								

Notes: The original sheets are in A4 horizontal format.

FIGURE S3: Survey questions.

Either the picture of the younger or the picture of the older woman was randomly shown with the following four questions below. Afterwards the picture of the other woman was shown with the same four questions below. The questions were answered on an eleven-point Likert scale from 0-10.

- How attractive do you find the person in the picture?
- How much would you notice the person in the picture in a group of people?
- As how friendly do you perceive the person in the picture?
- How important do you believe is it to protect the person in the picture from contracting COVID-19?

Notes: Translated from German to English.

Appendix B: Supplementary tables

TABLE S1: Exemplary day schedule for one store.

Time	Condition
7.30 - 8.00	*Preparation*
08.00 - 09.00	T-young figure
09.00 - 10.00	T-young figure
10.00 - 11.00	T-young figure
11.00 - 11.30	*Preparation and break*
11.30 - 12.30	control
12.30 - 13.30	*Break*
13.30 - 14.30	control
14.30 - 15.30	control
15.30 - 16.00	*Preparation and break*
16.00 - 17.00	T-older figure
17.00 - 18.00	T-older figure
18.00 - 19.00	T-older figure
After 19.00	*Preparation*

TABLE S2: Sample characteristics and balancing checks.

	Sample	Control	T-young figure	T-older figure	p-value	p-value
		(1)	(2)	(3)	(1) vs. (2)	(1) vs. (3)
	n=14,152	n=4,809	n=4,576	n=4,767		
Female	63.7	63.07	63.57	64.46	0.614	0.156
Youth	4.55	4.64	4.94	4.09	0.494	0.191
Adult	59.86	58.81	59.62	61.17	0.425	0.018
Golden	30.22	32.46	30.09	28.09	0.013	<0.001
Old	5.36	4.1	5.35	6.65	0.004	<0.001
Wednesday	32.43	32	30.46	34.74	0.108	0.005
Thursday	30.36	29.28	33.04	28.89	<0.001	0.673
Friday	37.21	38.72	36.49	36.38	0.026	0.018
Store 1	33.94	33.08	34.72	34.05	0.093	0.319
Store 2	37.29	37.22	36.34	38.26	0.377	0.293
Store 3	28.77	29.69	28.93	27.69	0.418	0.03

Notes: The table shows the distribution of gender, age groups, weekdays, and stores for the whole sample and for the three conditions. The last two columns report p-values from Fisher's two samples proportion tests comparing both treatments to the control condition.

TABLE S3: Logistic regression table hand disinfection, Models 1-5.

	Disinfected	Disinfected	Disinfected	Disinfected	Disinfected
	(1)	(2)	(3)	(4)	(5)
T-young	0.137***	0.136***	0.149***	0.146***	0.143***
	(0.042)	(0.042)	(0.043)	(0.043)	(0.043)
T-older	0.042	0.037	0.043	0.048	0.049
	(0.042)	(0.042)	(0.043)	(0.043)	(0.043)
female		0.356***	0.323***	0.322***	0.341***
		(0.036)	(0.036)	(0.036)	(0.037)
Age adult			0.742***	0.713***	0.762***
			(0.086)	(0.086)	(0.088)
Age golden			1.420***	1.400***	1.470***
			(0.089)	(0.090)	(0.092)
Age old			1.610***	1.610***	1.765***
			(0.118)	(0.118)	(0.121)
Thursday				0.187***	0.186***
				(0.045)	(0.045)
Friday				0.145***	0.135***
				(0.042)	(0.042)
Store_2					-0.392***
					(0.042)
Store_3					-0.032
					(0.045)
Constant	0.341***	0.119***	-0.810***	-0.897***	-0.805***
	(0.029)	(0.037)	(0.090)	(0.093)	(0.096)
Observations	14,152	14,152	14,152	14,152	14,152

Notes: The table presents estimates from logistic regressions. Robust standard errors are in parentheses. Significance levels: *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

TABLE S4: Linear regression table hand disinfection – Women.

	Disinfected	Disinfected	Disinfected	Disinfected
	(1)	(2)	(3)	(4)
T-young figure	0.027**	0.029**	0.028**	0.025**
	(0.013)	(0.012)	(0.012)	(0.012)
T-older figure	0.014	0.015	0.016	0.016
	(0.012)	(0.012)	(0.012)	(0.012)
Age adult		0.243***	0.235***	0.249***
		(0.024)	(0.024)	(0.025)
Age golden		0.384***	0.379***	0.401***
		(0.025)	(0.025)	(0.025)
Age old		0.436***	0.431***	0.486***
		(0.029)	(0.029)	(0.030)
Thursday			0.047***	0.048***
			(0.012)	(0.012)
Friday			0.031**	0.028**
			(0.012)	(0.012)
Store_2				-0.107***
				(0.012)
Store_3				0.001
				(0.013)
Constant	0.616***	0.327***	0.307***	0.333***
	(0.009)	(0.024)	(0.025)	(0.026)
Observations	9,015	9,015	9,015	9,015
r2	0.001	0.040	0.042	0.053

Notes: The table presents OLS estimates. Robust standard errors are in parentheses. Significance levels: *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

TABLE S5: Linear regression table hand disinfection – Men.

	Disinfected (1)	Disinfected (2)	Disinfected (3)	Disinfected (4)
T-young figure	0.042**	0.042**	0.041**	0.041**
	(0.017)	(0.017)	(0.017)	(0.017)
T-older figure	-0.001	0.001	0.001	0.001
	(0.017)	(0.017)	(0.017)	(0.017)
Age adult		0.072**	0.066*	0.071**
		(0.034)	(0.034)	(0.034)
Age golden		0.253***	0.249***	0.253***
		(0.035)	(0.035)	(0.035)
Age old		0.249***	0.257***	0.261***
		(0.047)	(0.048)	(0.048)
Thursday			0.034*	0.032*
			(0.018)	(0.018)
Friday			0.036**	0.035**
			(0.016)	(0.016)
Store_2				-0.063***
				(0.016)
Store_3				-0.021
				(0.017)
Constant	0.530***	0.404***	0.385***	0.409***
	(0.012)	(0.034)	(0.035)	(0.036)
Observations	5,137	5,137	5,137	5,137
r2	0.002	0.032	0.033	0.036

Notes: The table presents OLS estimates. Robust standard errors are in parentheses. Significance levels: *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

TABLE S6: Overview hand disinfection by treatment, age group, and gender.

	Sample disinfected n=8,471	Control disinfected (1) n=2,811	T-young figure disinfected (2) n=2,825	T-older figure disinfected (3) n=2,835	p-value (1) vs. (2)	p-value (1) vs. (3)	p-value (2) vs. (3)
Male-Youth	3.47	41.77	44.83	38.46	0.692	0.687	0.432
Male-Adult	57.57	47.26	52.21	47.70	0.021	0.835	0.037
Male-Golden	34.51	66.54	69.04	65.63	0.400	0.766	0.268
Male-Old	4.44	62.96	68.33	68.06	0.546	0.551	0.973
Female-Youth	2.48	32.64	40.29	29.23	0.181	0.543	0.057
Female-Adult	53.4	57.90	58.66	58.72	0.655	0.625	0.973
Female-Golden	36.26	70.00	75.53	72.39	0.006	0.247	0.130
Female-Old	7.85	73.43	79.46	79.18	0.199	0.193	0.944

Notes: The table shows p-values from two-sided Chi2-tests.

TABLE S7: Significance levels of hand disinfection rates by treatment and agegroup.

	p-value control vs. T-young	p-value control vs. T-older	p-value T-young vs. T-older
Age youth	0.181	0.443	0.040
Age adult	0.056	0.501	0.208
Age golden	0.009	0.462	0.069
Age old	0.141	0.124	0.983

Notes: The table shows p-values from two-sided Chi2-tests.

TABLE S8: Sample characteristics survey participants.

	Sample n=420	Age	SD Age	Mobile n=150
Male-Youth	24.14	16.41	0.5	50
Male-Adult	23.15	40.57	12.87	29.31
Male-Golden	25.62	66.44	4.08	12.07
Male-Old	27.09	78.85	3.7	8.62
Female-Youth	23.04	16.72	0.45	40.22
Female-Adult	25.81	40.13	11.73	32.61
Female-Golden	25.81	65.84	4.21	18.48
Female-Old	25.35	78.16	2.43	8.7

TABLE S9: Survey assessment of treatment figures overall and by age group.

	Overall T-older (1) n=420	Overall T-young (2) n=420	Age young T-older (1a) n=99	Age young T-young (2a) n=99	Age adult T-older (1b) n=103	Age adult T-young (2b) n=103	Age golden T-older (1c) n=108	Age golden T-young (2c) n=108	Age old T-older (1d) n=110	Age old T-young (2d) n=110
Attractiveness	5.77	7.23	2.9	5.09	3.05	5.95	4.74	7.56	6.56	8.15
Salience	4.93	5.87	3.26	4.19	2.14	4.71	3.74	5.67	5.15	6.37
Friendliness	8.29	7.9	7.99	6.57	8.33	6.43	7.7	7.67	8.37	8.67
Need for COVID-19 protection	8.45	7.5	8.18	6.15	8.48	6.24	7.89	7.07	7.81	7.04
Age	64	29	65	28	68	26	64	28	63	26

	p-value (1) vs. (2)	p-value (1a) vs. (2a)	p-value (1b) vs. (2b)	p-value (1c) vs. (2c)	p-value (1d) vs. (2d)	p-value (1a) vs. (1b)	p-value (1a) vs. (1c)	p-value (1a) vs. (1d)	p-value (1b) vs. (1c)	p-value (1b) vs. (1d)	p-value (1c) vs. (1d)	p-value (2a) vs. (2b)	p-value (2a) vs. (2c)	p-value (2a) vs. (2d)	p-value (2b) vs. (2c)	p-value (2b) vs. (2d)	p-value (2c) vs. (2d)
Attractiveness	<0.01	<0.01	<0.01	<0.01	<0.01	0.89	<0.01	<0.01	0.043	<0.01	<0.01	0.044	<0.01	<0.01	0.014	<0.01	0.15
Salience	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.3	<0.01	<0.01	<0.01	0.02	0.31	<0.01	<0.01	0.11	<0.01	0.11
Friendliness	<0.01	<0.01	<0.01	0.94	0.19	0.54	0.29	0.11	0.15	0.35	0.02	0.92	<0.01	<0.01	0.038	<0.01	0.02
Need for Covid-19 protection	<0.01	<0.01	<0.01	<0.01	0.012	0.71	0.71	0.92	0.55	0.66	0.85	0.89	0.09	0.08	0.25	0.25	0.73
Age	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	0.8	0.29	0.09	0.03	0.45	0.08	0.71	0.07	0.08	0.95	0.07