A young versus an older messenger: Effective health communication during the COVID-19 pandemic

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Abstract

Background: Among other measures, increased hand hygiene is advocated globally to fight the spread of COVID-19. To increase compliance with preventative measures, public communication commonly highlights the importance of protecting the elderly, as they are most at risk to suffer severe consequences from contracting SARS-CoV-2. The goal of this study is to provide a first indication of whether using older messengers in COVID-19 communication materials is an effective tool to increase adherence to preventative behaviors.

Methods: In a randomized controlled trial conducted in cooperation with a Swiss supermarket chain during the COVID-19 pandemic in summer 2020, we examine the effectiveness of two types of messengers that vary in their age. The two experimental treatments feature a life-sized cardboard figure holding a "thank-you" sign placed next to a hand disinfection station. One treatment showed an older woman in her mid-60s who belongs to the COVID-19 risk group. The other treatment displayed a young woman who may be an effective messenger as she is a more standard communicator.

Results: We do not find a significant effect of the older figure on hand disinfection behavior compared to the control treatment. In contrast, with the young figure as a messenger, hand disinfection rates increase by 3.3 percentage points compared to the control treatment (p = 0.004, chi2-test). The young messenger also leads to higher disinfection rates compared to the older messenger (p = 0.025, chi2-test).

Conclusion: Our findings provide first evidence that using older people as messengers is not inherently the best option to increase compliance with preventative measures. We discuss avenues for future research and implications for health communication.

Keywords: COVID-19, Messenger effects, Age, Hand hygiene, Randomized controlled trial, Behavioral public policy

Declarations of interest: none

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1. Introduction

The COVID-19 pandemic has had the world firmly in its grip for over two years, and waves of infection are still ongoing (World Health Organization, 2022b). Among other preventative measures such as face masks and social distancing, increased hand hygiene is advocated globally to fight the spread of the virus (World Health Organization, 2022a) and becomes a central research topic (see, e.g., Szczuka et al., 2022). To increase compliance with preventative measures, public communication commonly highlights the importance of protecting those most at risk.[2] Particularly the elderly potentially face severe consequences from infection with SARS-CoV-2 (Centers for Disease Control and Prevention, 2022; Federal Office of Public Health, 2022) and are therefore featured in preventative health appeals around the world to increase compliance.[3]

The study of messenger effects has a longstanding research tradition (Kassin, 1983). A messenger effect stipulates that the likelihood of a future behavior change depends on the decision maker's reaction to the source (Kassin, 1983, see also Dolan et al., 2012). Typically, studies compare the effect of lay citizens, experts, different organizations, or government officials as messengers (see, e.g., Hafner et al., 2019; Maclean et al., 2019; Whiting et al., 2019). This is also the focus of studies on messenger effects conducted during the COVID-19 pandemic. Studies include comparisons of experts to lay citizens (Limaye et al., 2022; Motta et al., 2021), different levels of expertise (Deslatte, 2020), or different levels of government (Deslatte, 2020; Favero et al., 2021) as the sender of the message. A related stream of research focuses on message endorsement by various types of celebrities or other publicly known figures (see, e.g. Abu-Akel et al., 2021, 2020; Reddinger et al., 2022). While findings on effectiveness by messenger type are mixed, the importance of using a popular messenger versus not using a messenger at all is confirmed in a large-scale experimental study in India by Banjeree et al. (2021). They used a trusted messenger in a video message advocating preventative behavior and find various improvements in COVID-19-related behaviors compared to only linking the governmental website with information.

However, to the best of our knowledge, there is no research examining the effectiveness of older compared to younger messengers in appealing to compliant behavior. Our study provides first evidence by analyzing a young versus an older woman as a messenger during the COVID-19 pandemic. The older woman as a messenger could be more effective because she is part of the COVID-19 risk group and therewith more affected. Several studies support this line of reasoning. For example, Grant and Hofmann (2011) find that referring to the group at risk (in their study patients in a hospital) leads to better hand hygiene of healthcare professionals. Similarly, during the pandemic, emphasizing other people's risk from COVID-19 infection may increase the willingness to engage in cautious behavior (Lunn et al., 2020; Ridder et al., 2022). However, research evidence so far is inconclusive. Focusing on the message and not on the messenger, the first evidence on age-based communication strategies during the pandemic shows the importance of highlighting risks to both, younger and older people, to increase the perception of COVID-19 as a severe disease. In contrast, only emphasizing the risks of older adults has little effect on attitudes and intended behaviors (Utych and Fowler, 2020). Therefore, also the young woman could be a better messenger. Apart from compliant behavior and the pandemic, research shows that attractive and somewhat idealized messengers can produce, for example, more favorable ad or product evaluations (Joseph, 1982), with attractiveness being attributed most often to younger people (Wernick and Manaster, 1984). Furthermore, studies generally identified more negative attitudes toward older adults in comparison to younger adults (for an overview, see the meta-analytic review of Kite et al., 2005).

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[2] See, for example, the prevention campaign in the UK, MullenLowe Group (2021).

[3] See, for example, the US-based, internationally active non-profit organization Prevent epidemics (Preventepidemics.org, 2020); the campaign from the government of India (Transforming India, 2021); the age with rights campaign on COVID-19 in South Africa (Center for Human Rights, 2020); or the governmental campaign in Switzerland (Federal Office of Public Health, 2020b).

The present study builds on the messenger literature to increase hand-sanitizing behavior in the entrance area of supermarkets during the COVID-19 pandemic. Given that these areas are already loaded with stimuli, we presented the messenger as a picture (for a similar approach, see Lunn et al., 2020 and Ridder et al., 2022). In this case, the pictures of two women are printed as life-sized cardboard figures, holding a sign with the message, "A big thank you for disinfecting your hands." We tested two specifications: In the first treatment, we presented a picture of a woman in her mid-60s (*T-older figure*). The older woman might foster compliance as she is part of the age-related COVID-19 risk group. Additionally, the picture of an older woman might entail a surprise effect and thus increase salience, as the retail chain had only used young messengers in their general marketing materials before the study. In the second treatment, we presented a cardboard figure displaying a younger woman in her late 20s (*T-young figure*), who represents a typical young protagonist. In the control treatment, there was no cardboard figure present.

We conducted the randomized controlled trial in July 2020 in three stores of a supermarket chain in Switzerland (N = 14,152). We find that in the control treatment, 58.5% of customers disinfect their hands. The older woman, who is part of the COVID-19 risk group, does not increase hand hygiene. In contrast, we find a statistically significant effect of the young figure, with hand disinfection rates that are 3.3 percentage points higher compared to the control treatment ($p = 0.004$, chi2-test). These differences are similar for customers of both genders and all age groups, apart from the oldest age group, in which both experimental treatments performed equally well. The young messenger also significantly outperformed the older messenger ($p = 0.025$, chi2-test). The effect size of the young messenger in the present study corresponds to an increase of 5.6%. This is similar to other studies on hand disinfection (for an overview, see Gould et al., 2017) and larger than the minimum detectable effect size of our study (see Section 2.3). Given the high number of shoppers, this increase would translate into thousands of additional pairs of clean and safe hands if the campaign were to be rolled out across the country.

Hand hygiene is one of the most effective low-cost measures to prevent infectious diseases (Gould et al., 2017; Haas and Larson, 2007). Our study provides a minimally invasive intervention that can be implemented in stimuli-loaded field settings. The findings complement existing research studies measuring intentions to comply with preventative behavior, as we observe behavior in the field and gather data on authentic decision-making. Even though many communication efforts feature older people during the pandemic, our findings provide a first indication that using older people as messengers is not inherently the best option to increase compliance with preventative measures. Our results speak to the importance of carefully testing the messenger itself and identify room for further studies in this domain.

2. Methods

2.1 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 randomized controlled trial with two treatment conditions and one control condition. The ethical standard of the study was approved, and the experimental details were preregistered.[4]

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. A similar approach was chosen by Ridder et al. (2022) using cardboard figures for some of their materials and is also comparable to Lunn et al. (2020) who presented posters with identifiable people as part of their online experiment. The two treatment conditions vary in terms of the age of the person displayed, that is, either an older woman (*T-older figure*) or a young woman (*T-young figure*). The control condition features the same hand disinfection station as the treatment conditions but without a cardboard figure (see Figure 1).

Figure 1: Illustration of the three experimental conditions.

Notes: In the experimental materials, also the print of the message was in color.

[4] The ethical standard was approved by the Faculty of Business Administration, Economics and Social Sciences of the University of Bern (no. 072020), and the experimental details were preregistered with the American Economic Association's registry (AEARCTR-0006033).

2.2 Data collection

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).[5] The three treatments were randomized across the three days, three stores, and three daily time slots (see Table 1). On each of the three observation days, data were collected from 8 am to 7 pm excluding in total 2 hours of breaks between the conditions and for lunch. At the beginning of a break, the experimental conditions were swapped according to the randomization schedule (see Table S1 in the Appendix).

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

For each time slot, there was one unobtrusive observer at each supermarket, placed with a good view of the entrance area. The observers were situated 5–10 meters from the hand disinfection station and hidden at an unused cash desk, the customer service registry, or observed the live video footage in the security room. Hand disinfection behavior was captured manually, differentiated by gender (captured as binary) and age group (captured as categorical with four distinct age groups).

Observers made direct estimations of both characteristics and recorded them immediately on paper (see Figure S1 in the Appendix for a sample sheet). Gender was included as a control variable, as COVID-19-related survey data from Switzerland and other OECD countries show that women are more likely to see COVID-19 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 that women have stronger hand hygiene knowledge and behavior (Anderson et al., 2008; Suen et al., 2019), and generally show better preventive health behavior than men (Hiller et al., 2017). Additionally, age was included as a control variable, as older age seems to be associated with higher intended compliance (Wang et al., 2021), as well as with perceiving higher risks of dying if contracting COVID-19 (Bruine de Bruin, 2021). The data from the control treatment of this study are also used as part of a larger study reporting gender and age differences in adherence to hand hygiene recommendations (von Bieberstein et al., 2022). The data of the two experimental treatments are uniquely reported in this study.

[5] For the selection criteria of the three stores, see the methods section in the Appendix.

2.3 The sample

In total, the behavior of 14,152 customers was captured in the experiment. The 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 (Federal Office of Public Health, 2020a). The *golden* age group also has a higher risk of severe consequences from infection than the two younger age groups (Federal Office of Public Health, 2020a) and therefore, is regarded as the secondary age risk group.

As shown in Table S2 in the Appendix, we captured the behavior of about 4,580 to 4,800 customers per treatment. Given $\alpha = 0.05$ and power $(1 - \beta) = 0.80$, this results in a minimum detectable effect size of 2.8 percentage points (chi2-test). The customers are evenly split across the three experimental conditions; gender and age groups are also fairly evenly distributed across the three conditions (see Table S2 in the Appendix).

3. Results

We examine the influence of the two messenger types on disinfecting one's hands before entering a supermarket store. In the control treatment, 58.5% of customers disinfect their hands. 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). In contrast, 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 ($p = 0.004$, chi2-test). The effect size corresponds to an increase of 5.6% and is similar to other studies on hand disinfection (Gould et al., 2017). Comparing hand disinfection in *T-young figure* to *T-older figure* shows that the disinfection rate in the treatment with the young messenger 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 *T-young figure* on hand disinfection rates. The magnitude of the effect remains stable when controlling for gender (Model 2), age (Model 3), store (Model 4), time slot (5), and weekday (Model 6). In addition to the significant treatment effect observed for *T-young figure*, Models 2 and 3 show that hand disinfection rates are higher for women than for men and higher for older people than for younger people. These differences are in line with a larger observational study on hand disinfection behavior in Swiss supermarkets (von Bieberstein et al., 2022). When logistic regression models are run, the results remain robust with a stable effect size (see Table S3 in the Appendix).

One limitation of this study is that we cannot control for people entering the store together or for people being affected by the behavior of other shoppers who entered immediately before them. As a conservative estimate to control for these potential peer effects, we also re-estimate Model 6 clustering standard errors by hour per store and day (81 clusters) and again find a significant treatment effect (coefficient = 0.032, $p = 0.012$, SE = 0.012).

Table 2: Hand disinfection behavior, models 1-6.

	Disinfected (1)	Disinfected (2)	Disinfected (3)	Disinfected (4)	Disinfected (5)	Disinfected (6)
T-young	0.033***	0.032***	0.034***	0.033***	0.033***	0.032***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
T-older	0.010	0.009	0.010	0.010	0.010	0.011
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Female		0.086***	0.076***	0.080***	0.078***	0.078***
		(0.009)	(0.009)	(0.008)	(0.009)	(0.009)
Adult			0.181***	0.191***	0.188***	0.181***
			(0.020)	(0.020)	(0.020)	(0.020)
Golden			0.336***	0.350***	0.343***	0.338***
			(0.020)	(0.021)	(0.021)	(0.021)
Old			0.373***	0.407***	0.398***	0.397***
			(0.025)	(0.025)	(0.026)	(0.026)
Store2				-0.091***	-0.090***	-0.090***
				(0.010)	(0.010)	(0.010)
Store3				-0.007	-0.007	-0.007
				(0.010)	(0.010)	(0.010)
Timeslot2					-0.028***	-0.028***
					(0.010)	(0.010)
Timeslot3					-0.035***	-0.036***
					(0.010)	(0.010)
Thursday						0.042***
						(0.010)
Friday						0.032***
						(0.010)
Constant	0.585***	0.530***	0.306***	0.328***	0.354***	0.335***
	(0.007)	(0.009)	(0.021)	(0.021)	(0.022)	(0.023)
Observations	14152	14152	14152	14152	14152	14152

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

Gender or age differences in the reaction to the treatment could be present. The sample size split by gender and age groups is not sufficiently large to conduct statistical analyses and we did not have any hypotheses on treatment differences between those subgroups. In the following, we present a general overview aimed at providing a more nuanced picture of our findings (see Table S4 in the Appendix for an overview).

Comparing *T-older figure* to the control condition, disinfection rates are almost the same for men and slightly higher for women (+1.4 percentage points (pp)). Concerning age, we observe in *T-older figure* slightly higher disinfection rates for the age groups *adult* and *golden* (about +1 pp), considerably higher for *old* (+6.1 pp), but smaller for *youth* (-3.6 pp) compared to the control condition. None of these differences are statistically significant. Contrarily, in the treatment *T-young figure*, disinfection rates are higher than in the control condition for both genders (men +4.2 pp; p = 0.014, and women +2.7 pp; p = 0.032, chi2-tests) and all age groups (+2.6 up to +6.2 pp).[6] Comparing the two messenger treatment conditions reveals the following: 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). Concerning age, *T-young figure* also has higher disinfection rates than *T-older figure* in all age groups, except for the oldest one where both treatments are similarly effective.[7]

[6] The difference is significant in the *adult* (p = 0.056, chi2 test) and *golden* (p = 0.009, chi2 test) age groups.
[7] 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.

4. Discussion and conclusion

Measures to enhance health behaviors such as increased hand hygiene can only work if people comply with them. To foster compliance with COVID-19 regulations, a broad range of communication material features older people as messengers (see, e.g., Federal Office of Public Health, 2020b; Preventepidemics.org, 2020), as they have the highest risk for a severe course of the disease. While several messenger types have been compared in prior studies (see, e.g., Deslatte, 2020; Limaye et al., 2022; Motta et al., 2021), there is no evidence regarding messengers from different age groups yet. Our research provides a first test of the effectiveness of a young and an older messenger on compliance with hand disinfection recommendations during the COVID-19 pandemic. In a field study in Swiss supermarkets, we find that an older figure as a messenger does not increase hand disinfection rates significantly compared to the control condition (no messenger). In contrast, a young woman as a messenger increases hand disinfection rates significantly compared to the control condition (+3.3 percentage points) and compared to the older messenger (+ 2.3 percentage points). These results prove to be robust not just for a subgroup of shoppers, but for people across all age groups (apart from the oldest age group, where both experimental conditions work equally well) and for both genders.

Research conducted during the COVID-19 pandemic shows that emphasizing the threat of infection for a vulnerable person can lead to higher intended compliance with preventative health measures (see, e.g., Lunn et al., 2020; Ridder et al., 2022). These studies, however, focus not only on showing people from risk groups but directly highlighting their risk or evoking empathy in an accompanying message. Our results add to this literature by showing that purely presenting an older messenger without further information about her vulnerability does not lead to a change of preventative behavior in our setting.

The message we chose was comparatively neutral, reinforcing reciprocity by thanking the entering customer for hand disinfection. Other messages might produce different effects. For instance, Utych and Fowler (2020) focus on the message instead of the messenger and show that only pointing out the threats for the elderly is not effective, whereas additionally highlighting the threats for younger people makes individuals perceive COVID-19 as a more serious threat. Future research could examine the interplay between the (older) messenger and the message more closely.

Our study design brings along two main limitations. First, as the different stores for this experiment were selected to be as homogeneous as possible, we cannot examine potentially differing effects based on sociodemographic factors such as cultural region, income, or urbanity. Future research would benefit from analyzing a more heterogeneous sample to derive potential differences. Second, while we do not claim to test a representative sample of older or young messengers, other idiosyncratic characteristics of our two messenger figures could be important. Subsequent studies could specifically examine additional characteristics and different age groups of the messenger as a means of fostering compliance with hand hygiene regulations and other health behaviors. For instance, it could well be that very old messengers looking particularly vulnerable produce a different effect. Our results lay the first basis and speak for a detailed analysis of older and vulnerable messengers and their power to increase preventative health behavior.

In sum, our study's findings contribute to a more viable picture of compliance with public health recommendations. Our study features a broad population sample of people from all age groups who do their grocery shopping and offers insights into compliance with health regulations in public places. In addition, regarding compliance measurement, most previous research on COVID-19-related behavior relied on self-reported measures. Although intentions are an important antecedent of behavior, they do not always translate into actual behavior (Ajzen et al., 2009; Ajzen, 1991; Sheeran, 2002). Consequently, measuring actual behavior is an important complement to self-reports.

This paper highlights the importance of messengers and provides a first examination of the use of an older messenger during the COVID-19 pandemic and its effectiveness in promoting hand disinfection. Our results point in the direction that using older people as messengers is not inherently the best option to increase compliance with preventative measures. This should be taken into account in the design of future health campaigns and policy communication. While our study analyses hand disinfection, our reasoning extends to messenger effects in other health communications and policy designs. Similar challenges could arise, for example, in increasing the willingness to participate in contract tracing (van Fossen et al., 2022) or complying with other safety measures like social distancing (Epton et al., 2022). The examination of messenger effects from different age groups thus opens up a variety of new questions and provides a broad avenue for future research.

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References

Abu-Akel, A., Spitz, A., West, R., 2020. Who is listening? Spokesperson effect on communicating social and physical distancing measures during the COVID-19 pandemic. Frontiers in psychology 11, 564434. https://doi.org/10.3389/fpsyg.2020.564434.

Abu-Akel, A., Spitz, A., West, R., 2021. The effect of spokesperson attribution on public health message sharing during the COVID-19 pandemic. PloS one 16, e0245100. https://doi.org/10.1371/journal.pone.0245100.

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes 50, 179–211.

Ajzen, I., Czasch, C., Flood, M.G., 2009. From intentions to behavior: Implementation intention, commitment, and conscientiousness. Journal of Applied Social Psychology 39, 1356–1372. https://doi.org/10.1111/j.1559-1816.2009.00485.x.

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

Banjeree, A., Alsan, M. Breza, E., Chandrasekhar, A., Chowdhury, A., Duflo, E., Goldsmith-Pinkham, P. & Olken, B., 2021. Can a trusted messenger change behavior when information is plentiful? Evidence from the first months of the COVID-19 pandemic in West Bengal. Working Paper.

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, e24-e29. https://doi.org/10.1093/geronb/gbaa074.

Center for Human Rights, 2020. Age with rights campaign on COVID-19. URL:https://www.chr.up.ac.za/news-wru/2018-agewithrights-10-day-campaign-on-covid-19/, last accessed 2022-11-11.

Centers for Disease Control and Prevention, 2022. COVID-19 risks and vaccine information for older adults. URL: https://www.cdc.gov/aging/covid19/covid19-older-adults.html#increased-risk, last accessed 2022-11-10.

Deslatte, A., 2020. To shop or shelter? Issue framing effects and social-distancing preferences in the COVID-19 pandemic. JBPA 3. https://doi.org/10.30636/jbpa.31.158.

Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R., Vlaev, I., 2012. Influencing behaviour: The mindspace way. Journal of Economic Psychology 33, 264–277.

Epton, T., Ghio, D., Ballard, L.M., Allen, S.F., Kassianos, A.P., Hewitt, R., Swainston, K., Fynn, W.I., Rowland, V., Westbrook, J., Jenkinson, E., Morrow, A., McGeechan, G.J., Stanescu, S., Yousuf, A.A., Sharma, N., Begum, S., Karasouli, E., Scanlan, D., Shorter, G.W., Arden, M.A., Armitage, C.J., O'Connor, D.B., Kamal, A., McBride, E., Swanson, V., Hart, J., Byrne-Davis, L., Chater, A., Drury, J., 2022. Interventions to promote physical distancing behaviour during infectious disease pandemics or epidemics: A systematic review. Social science & medicine (1982) 303, 114946. https://doi.org/10.1016/j.socscimed.2022.114946.

Favero, N., Jilke, S., Wolfson, J.A., Xu, C., Young, M.M., 2021. Messenger effects in COVID-19 communication: Does the level of government matter? Health Policy OPEN 2, 100027.

Federal Office of Public Health, 2020a. COVID-19 vaccination strategy. URL: https://www.newsd.admin.ch/newsd/message/attachments/64533.pdf, last accessed 2022-07-18.

Federal Office of Public Health, 2020b. Der Bund wirbt nun für das Impfen. URL: https://www.persoenlich.com/kategorie-werbung/der-bund-wirbt-nun-fur-das-impfen/, last accessed 2022-11-11.

Federal Office of Public Health, 2022. Kategorien besonders gefährderte Personen. URL: https://www.bag.admin.ch/dam/bag/de/dokumente/mt/k-und-i/aktuelle-ausbrueche-pandemien/2019-nCoV/kategorien-besonders-gefaehrdete-personen.pdf.download.pdf/Kategorien%20besonders%20gefaehrdeter%20Personen.pdf, 2022-11-10.

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

Gould, D.J., Moralejo, D., Drey, N., Chudleigh, J.H., Taljaard, M., 2017. Interventions to improve hand hygiene compliance in patient care. Cochrane Database of Systematic Reviews 1, 1465–1858.

Grant, A.M., Hofmann, D.A., 2011. It's not all about me: Motivating hand hygiene among health care professionals by focusing on patients. Psychological Science 22, 1494–1499.

Haas, J.P., Larson, E.L., 2007. Measurement of compliance with hand hygiene. Journal of Hospital Infection 66, 6–14.

Hafner, R., Elmes, D., Read, D., 2019. Exploring the role of messenger effects and feedback frames in promoting uptake of energy-efficient technologies. Curr Psychol 38, 1601–1612. https://doi.org/10.1007/s12144-017-9717-2.

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

Joseph, P.W.B., 1982. The credibility of physically attractive communicators: A review. Journal of Advertising 11, 15–24. https://doi.org/10.1080/00913367.1982.10672807.

Kassin, S.M., 1983. Deposition testimony and the surrogate witness: Evidence for a" messenger effect" in persuasion. Personality and Social Psychology Bulletin 9, 281–288.

Kite, M.E., Stockdale, G.D., Whitley, B.E., Johnson, B.T., 2005. Attitudes toward younger and older adults: An updated meta-analytic review. J Social Issues 61, 241–266. https://doi.org/10.1111/j.1540-4560.2005.00404.x.

Limaye, R.J., Balgobin, K., Michel, A., Schulz, G., Erchick, D.J., 2022. What message appeal and messenger are most persuasive for COVID-19 vaccine uptake: Results from a 5-country survey in India, Indonesia, Kenya, Nigeria, and Ukraine. PloS one 17, e0274966. https://doi.org/10.1371/journal.pone.0274966.

Lunn, P.D., Timmons, S., Belton, C.A., Barjaková, M., Julienne, H., Lavin, C., 2020. Motivating social distancing during the COVID-19 pandemic: An online experiment. Social Science & Medicine 265, 113478. https://doi.org/10.1016/j.socscimed.2020.113478.

Maclean, J.C., Buckell, J., Marti, J., 2019. Information source and cigarettes: Experimental evidence on the messenger effect, Cambridge, MA.

Motta, M., Sylvester, S., Callaghan, T., Lunz-Trujillo, K., 2021. Encouraging COVID-19 vaccine uptake through effective health communication. Front. Polit. Sci. 3, 630133. https://doi.org/10.3389/fpos.2021.630133.

MullenLowe Group, 2021. Look me in the eyes. Governmental campaign 2021. URL: https://www.mullenlowegroupuk.com/case-studies/look-them-in-the-eyes, last accessed 2022-11-11.

Nivette, A., Ribeaud, D., Murray, A., Steinhoff, A., Bechtiger, L., Hepp, U., Shanahan, L., 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. https://doi.org/10.1016/j.socscimed.2020.113370.

Preventepidemics.org, 2020. Stay safe in this holiday season. URL: https://preventepidemics.org/covid19/us-response/campaigns/be-the-one/, last accessed 2022-11-11.

Reddinger, J.L., Levine, D., Charness, G., 2022. Can targeted messages reduce COVID-19 vaccination hesitancy? A randomized trial. Preventive medicine reports 29, 101903. https://doi.org/10.1016/j.pmedr.2022.101903.

Ridder, D. de, Aarts, H., Benjamins, J., Glebbeek, M.-L., Leplaa, H., Leseman, P., Potgieter, R., Tummers, L., Zondervan-Zwijnenburg, M., 2022. "Keep your distance for me": A field experiment on empathy prompts to promote distancing during the COVID-19 pandemic. Journal of Community & Applied Social Psychology 32, 755–766.

Sheeran, P., 2002. Intention—behavior relations: a conceptual and empirical review. European Review of Social Psychology 12, 1–36.
Suen, L.K.P., So, Z.Y.Y., Yeung, S.K.W., Lo, K.Y.K., Lam, S.C., 2019. Epidemiological investigation on hand hygiene knowledge and behaviour: A cross-sectional study on gender disparity. BMC Public Health 19, 1–14.
Szczuka, Z., Siwa, M., Abraham, C., Baban, A., Brooks, S., Cipolletta, S., Danso, E., Dombrowski, S.U., Gan, Y., Gaspar, T., Gaspar de Matos, M., Griva, K., Jongenelis, M., Keller, J., Knoll, N., Ma, J., Abdul Awal Miah, M., Morgan, K., Peraud, W., Quintard, B., Shah, V., Schenkel, K., Scholz, U., Schwarzer, R., Taut, D., Tomaino, S.C., Vilchinsky, N., Wolf, H., Luszczynska, A., 2022. Handwashing adherence during the COVID-19 pandemic: A longitudinal study based on protection motivation theory. Social Science & Medicine, 115569. https://doi.org/10.1016/j.socscimed.2022.115569.
Transforming India, 2021. Protecting the elderly from COVID-19. URL: https://transformingindia.mygov.in/covid19/covid-19-protecting-the-elderly/, last accessed 2022-11-11.
Utych, S.M., Fowler, L., 2020. Age-based messaging strategies for communication about COVID-19. JBPA 3. https://doi.org/10.30636/jbpa.31.151.
van Fossen, J.A., Ropp, J.W., Darcy, K., Hamm, J.A., 2022. Comfort with and willingness to participate in COVID-19 contact tracing: The role of risk perceptions, trust, and political ideology. Social science & medicine (1982) 306, 115174. https://doi.org/10.1016/j.socscimed.2022.115174.
von Bieberstein, F., Kulle, A.-C., Schumacher, S., 2022. Large gender and age differences in hand disinfection behavior during the COVID-19 pandemic: Field data from Swiss retail stores. Working Paper.
Wang, D., Marmo-Roman, S., Krasem K., 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 60, 240–255. https://doi.org/10.1080/00981389.2020.1871157.
Wernick, M., Manaster, G.J., 1984. Age and the perception of age and attractiveness. Gerontologist 24, 408–414. https://doi.org/10.1093/geront/24.4.408.
Whiting, A., Kecinski, M., Li, T., Messer, K.D., Parker, J., 2019. The importance of selecting the right messenger: A framed field experiment on recycled water products. Ecological Economics 161, 1–8. https://doi.org/10.1016/j.ecolecon.2019.03.004.
World Health Organization, 2022a. Coronavirus disease (COVID-19): Advice for the public. URL: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public, last accessed 2022-11-10.
World Health Organization, 2022b. WHO Coronavirus (COVID-19) dashboard. URL: https://covid19.who.int/, last accessed 2022-11-15.

Appendix

1. Experimental materials

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								

Figure S1: Sample data collection sheet.

Notes: The original sheets are in A4 horizontal format.

2. Methods

Implementation details: Store selection and time of the study

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, concerning the average number of customers per day, a range of 800 to 1,400 customers was selected based on the number of checkout transactions for a comparable week in May 2020. 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). 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 that 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 that 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 have only one entrance that is easy to observe with a minimum of invasiveness. From the list of eligible stores, three stores were chosen that were assessed to be as homogeneous as possible in terms of location and the sociodemographic information 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.

Table S1: Exemplary day schedule for one store.

Time	Condition
07.30 – 08.00	*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*

3. Supplementary analysis

Table S2: Sample characteristics and balancing checks.

	Sample n = 14,152	Control (1) n = 4,809	*T-young figure* (2) n = 4,576	*T-older figure* (3) n = 4,767	*p*-value (1) vs. (2)	*p*-value (1) vs. (3)
Female	63.7	63.1	63.6	64.5	0.614	0.156
Youth	4.6	4.6	4.9	4.1	0.494	0.191
Adult	59.9	58.8	59.6	61.2	0.425	0.018
Golden	30.2	32.5	30.1	28.1	0.013	<0.001
Old	5.4	4.1	5.4	6.7	0.004	<0.001
Wednesday	32.4	32.0	30.5	34.7	0.108	0.005
Thursday	30.4	29.3	33.0	28.9	<0.001	0.673
Friday	37.2	38.7	36.5	36.4	0.026	0.018
Store 1	33.9	33.1	34.7	34.1	0.093	0.318
Store 2	37.3	37.2	36.3	38.3	0.377	0.293
Store 3	28.8	29.7	28.9	27.7	0.418	0.030

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 chi2-tests comparing both treatments to the control condition.

Table S3: Hand disinfection behavior, logistic regressions, models 1-6.

	Disinfected (1)	Disinfected (2)	Disinfected (3)	Disinfected (4)	Disinfected (5)	Disinfected (6)
T-young	0.137^{***}	0.136^{***}	0.149^{***}	0.147^{***}	0.147^{***}	0.143^{***}
	(0.042)	(0.042)	(0.043)	(0.043)	(0.043)	(0.043)
T-older	0.042	0.037	0.043	0.045	0.044	0.047
	(0.042)	(0.042)	(0.043)	(0.043)	(0.043)	(0.043)
Female		0.356^{***}	0.323^{***}	0.342^{***}	0.335^{***}	0.334^{***}
		(0.036)	(0.036)	(0.036)	(0.036)	(0.037)
Adult			0.742^{***}	0.791^{***}	0.781^{***}	0.751^{***}
			(0.085)	(0.086)	(0.086)	(0.086)
Golden			1.420^{***}	1.490^{***}	1.460^{***}	1.439^{***}
			(0.089)	(0.089)	(0.090)	(0.090)
Old			1.610^{***}	1.770^{***}	1.731^{***}	1.726^{***}
			(0.118)	(0.119)	(0.120)	(0.120)
Store2				-0.394^{***}	-0.393^{***}	-0.391^{***}
				(0.042)	(0.042)	(0.042)
Store3				-0.033	-0.034	-0.033
				(0.045)	(0.045)	(0.045)
Timeslot2					-0.124^{***}	-0.125^{***}
					(0.043)	(0.043)
Timeslot3					-0.156^{***}	-0.156^{***}
					(0.045)	(0.045)
Thursday						0.186^{***}
						(0.045)
Friday						0.138^{***}
						(0.042)
Constant	0.341^{***}	0.119^{***}	-0.810^{***}	-0.722^{***}	-0.607^{***}	-0.690^{***}
	(0.029)	(0.037)	(0.089)	(0.091)	(0.096)	(0.098)
Observations	14,152	14,152	14,152	14,152	14,152	14,152

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

Table S4: Hand disinfection by gender and age group across treatments.

	Sample	Control (1)	*T-young figure* (2)	*T-older figure* (3)	*p*-value (1) vs. (2)	*p*-value (1) vs. (3)	*p*-value (2) vs. (3)
Male	54.4	53.0	57.2	53.0	0.014	0.958	0.013
Female	63.0	61.6	64.3	63.1	0.032	0.245	0.314
Youth	37.0	35.9	42.0	32.3	0.181	0.443	0.040
Adult	54.8	53.6	56.2	54.5	0.056	0.501	0.208
Golden	70.7	68.9	73.3	70.1	0.009	0.462	0.069
Old	75.1	70.6	76.7	76.7	0.141	0.124	0.983

Notes: The last three columns report *p*-values from chi2-tests.