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## **Nudging to Increase Hand Hygiene During the COVID-19 Pandemic: A Field Experiment**

Robert J. Weijers and Björn B. de Koning

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## BRIEF REPORT

# Nudging to Increase Hand Hygiene During the COVID-19 Pandemic: A Field Experiment

Robert J. Weijers and Björn B. de Koning

Department of Psychology, Education, and Child Studies, Erasmus University Rotterdam

The COVID-19 pandemic has made a significant impact on citizens all around the world. In order to prevent the spread of the virus, one of the most important measures is practicing hand hygiene. We see nudging, a technique from behavioural economics, as a possible way to increase hand hygiene without relying on mandatory measures. In this field experiment, we test two nudge types that previously have been applied successfully, a salience nudge and a gain frame nudge, in a new context (i.e., shopping street). Four hundred nineteen shoppers were observed during a counterbalanced experiment in three stores, where a disinfectant dispenser was accompanied by a salience nudge, gain frame nudge, or no nudge. Data on dispenser usage was analysed using mixed models to account for groups entering the store. When compared to the control condition, no significant effect of either nudge on participants using the disinfectant was found. This could be caused by the increased attention for hand hygiene during COVID-19, because the baseline for practicing hand hygiene in our study was much higher than that in previous pre-COVID-19 studies. Alternatively, it is possible that shoppers already disinfected their hands before leaving the house, as advised by the government. Our results suggest that stores, and governments, should look for other measures than the tested nudges to improve hand hygiene in the shopping street during the COVID-19 pandemic, either combining different nudges and/or using less subtle methods.

### **Public Significance Statement**

During the COVID-19 pandemic, encouraging hand hygiene is very important. We investigated two nudging techniques to improve the use of a disinfectant dispenser in a shopping street, namely drawing attention to it (i.e., salience nudge) and emphasising the gains of hand hygiene (i.e., gain frame nudge). We found that these nudging interventions did not increase hand hygiene. People who want to increase hand hygiene should therefore focus on other, perhaps less subtle, interventions and/or combine this with nudging interventions.

**Keywords:** nudging, hand hygiene, COVID-19, salience, gain frame

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The COVID-19 pandemic has made a significant impact on how citizens all around the world lead their daily lives. As of August 2020, the virus has infected more than 20 million people and caused over 750.000 deaths (Johns Hopkins University, 2020).

Consequently, around the globe governments have taken behavioural measures to stop the spread of the virus. Although some of the measures that were taken are mandatory (e.g., keeping distance), many of the behavioural measures that have been invoked rely on humans behaving in accordance with the set guidelines. One of the most important, nonmandatory measures is practicing hand hygiene (Rijksinstituut voor Volksgezondheid en Milieu [RIVM], 2020a; World Health Organization [WHO], 2020) because hand hygiene prevents infection and slows transmission of the COVID-19 virus (WHO, 2020).

Robert J. Weijers  <https://orcid.org/0000-0002-3053-552X>

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Correspondence concerning this article should be addressed to Robert J. Weijers, Department of Psychology, Education, and Child Studies, Erasmus University Rotterdam, Burgemeester Oudlaan 50, 3062 PA, Rotterdam, the Netherlands. Email: [weijers@essb.eur.nl](mailto:weijers@essb.eur.nl)

When this study took place, in May 2020, the Netherlands had more than 40.000 confirmed COVID-19 cases and over 5.000 COVID-19 deaths (RIVM, 2020b). Yet, a considerable number of people in the Netherlands do not practice hand hygiene or do so insufficiently (Yousuf et al., 2020). This study therefore aimed to

support people in engaging in hand hygiene activities by drawing on nudging as a possible successful tool to increase the desired behaviour. Nudging is a psychological intervention technique to create subtle changes in the environment that alter people's behaviour (Thaler & Sunstein, 2008). Nudging, based on dual process theory (Thaler & Sunstein, 2008), makes use of cognitive biases to change behaviour into the desired direction: A nudge "changes behaviour in a predictable way without forbidding any options or significantly changing their economic incentives" (Thaler & Sunstein, 2008, p. 6). Examples of nudges include usage of a fly in a urinal to reduce spillage, the placement of healthy food in a cafeteria at eye height to promote healthy lunches, or automatic enrollment in being an organ donor (for more examples, see Weijers, de Koning, & Paas, 2020). Nudging has been successful in changing human behaviour in various fields, including hand hygiene (Szasz et al., 2018).

The studies that have attempted to increase hand hygiene with nudges have been conducted in the pre-COVID-19 era. Caris et al. (2018), for example, conducted an intervention study to promote hand hygiene in a health care setting. Next to a hand sanitizer dispenser, Caris et al. placed a poster that emphasised the decrease in hospital infections when practicing proper hand hygiene. The message on the poster was "40% more hand hygiene, 40% less hospital infections." The nudge technique here is called framing: changing the way in which information is presented. More specifically, the nudge in Caris et al. provided a gain frame: It attempted to nudge behaviour by presenting the benefits of performing a certain behaviour, instead of presenting the losses for not performing the behaviour. The poster with the gain frame led to 1.5 times more usage of the hand sanitizer dispenser in the hospital compared to the control condition where this message was not presented.

Positive effects of nudging on hand hygiene in a medical setting were also reported by D'Egidio et al. (2014). In this study, a salience nudge, which is a noninformative nudge intended to draw attention (Dolan et al., 2012), was used. The salience nudge consisted of flashing lights next to the hand sanitizer dispenser in an academic hospital to make the hand sanitizer more salient. Results showed that hand washing was nearly doubled, from a baseline of 12.4% to 23.5%. A different salience nudge, in a nonmedical setting, was used in primary schools in Bangladesh, where a painted path and footprints led toward a hand-washing latrine. This nudge increased the handwashing rate from 4% to 68% (Dreibelbis et al., 2016).

In the present study, we extended earlier work on nudging hand hygiene by investigating the effectiveness of nudging hand hygiene during the COVID-19 pandemic and studying this in a new setting. Specifically, we attempted to increase hand hygiene in a Dutch shopping street using a gain frame and a salience nudge to support the use of a hand sanitizer. We chose these nudges because of their effectiveness in previous studies (Caris et al., 2018; D'Egidio et al., 2014; Dreibelbis et al., 2016) and the ease with which stores can implement these nudges. Based on earlier research showing benefits of both types of nudges in promoting hand hygiene in a high stakes environment (Caris et al., 2018; D'Egidio et al., 2014), we hypothesised that the gain frame nudge and the salience nudge would increase hand hygiene behaviour (i.e., more often using the hand sanitizer) compared to a control condition that was not nudged.

## Method

### Participants

In this field experiment, participants were all persons who entered a clothing store. Their apparent gender and an estimation of their age group was made by the observer. Four age groups were created; that is, below 18 years, 18–30 years, 31–70 years, and above 70 years. These age groups were created using guidelines of the RIVM (2020c), because persons below 18 were indicated to be less likely to transmit the virus, whereas persons over 70 years are more at risk. Children who were considered too young to be able to use the dispenser to disinfect their hands independently were excluded from the study. The study was done in three different cities in the west of the Netherlands (Rotterdam, Middelburg, and Halsteren). Rotterdam is a large city in an urban area, whereas Middelburg is a medium-sized city in a rural area and Halsteren is a small urban town. A total of 451 persons, of which 319 were in Rotterdam, 77 in Middelburg, and 55 in Halsteren, were observed.

### Design

A stand with hand sanitizer stood at the entrance of three clothing stores. Before the start of the experiment, the stores were already using a stand to provide disinfectant for their customers, and we used this stand for our experiment. We used a design with three between-subjects conditions: salience nudge, gain frame nudge, and control (no nudge). The experiment ran for three afternoons in the same week. Every day, the stand was changed to provide a salience nudge, a gain frame nudge, or no nudge, so that every store ran each nudge, but on a different day. To prevent order effects, we used counterbalancing (see Table 1). The study was conducted in accordance with the code of ethics for the social and behavioural sciences endorsed by all universities in the Netherlands, as well as the guidelines of Erasmus School of Social and Behavioural Sciences, Erasmus University Rotterdam.

### Materials and Procedure

During three afternoons in May 2020, the entrances of three stores were observed. To investigate whether the nudges effectively improved hand hygiene, we recorded for each participant whether they disinfected their hands when they entered the store, resulting in a binary measure (yes, no) per individual. Additionally, an estimation of the age and gender of the customer was made by the observer, and it was indicated whether participants entered the store together with other participants. These participants were grouped together in the data by giving them the same group number. This was to be able to account for subgroups of participants during data analysis.

**Table 1**  
*Counterbalancing of Nudge Type During the Experiment*

Store	Day 1	Day 2	Day 3
Store 1 (Rotterdam)	Salience	Control	Gain frame
Store 2 (Middelburg)	Control	Gain frame	Salience
Store 3 (Halsteren)	Gain frame	Salience	Control

In the control condition, a message was created to accompany the disinfectant on the stand stating “You can disinfect your hands here” in a large, readable font (Verdana 48), which served as a baseline. In the salience nudge condition, the basic message was combined with a variant of a salience nudge consisting of three blue arrows pointing toward the stand on which the hand sanitizer was placed. The colour blue was chosen for the arrows because of its association with health (Manav, 2007). In the gain frame nudge condition, the basic message used in the other two conditions was adapted based on the nudge of Caris et al. (2018) and the advice of the Dutch National Institute of Public Health and the Environment (RIVM, 2020a) by adding the sentence “Disinfect your hands, to reduce the likelihood you or someone close to you becomes ill!” in the same large, readable font as used for the baseline message. The composition of the stand in each condition is illustrated in Figure 1.

**Analysis**

The main research question was investigated using a mixed effects model approach in the statistical program R (R Core Team, 2017), using the lme4 package (Bates et al., 2015), with nudge type (salience, gain frame, control) as the independent variable and using the dispenser (yes, no) as the dependent variable. The variable nudge type was dummy-coded to be able to compare both nudge types to the control group. Group number was added as a random factor. To optimise the random structure, the suggestions of Barr et al. (2013) were used as a guideline. Had the model failed to converge, the corresponding chi-square analysis was used instead. To determine *p* values, we used the likelihood ratio test function of the package afex (Singmann et al., 2020). The script that we used can be found in the online supplemental materials.

**Results**

The usage of the dispenser per condition, gender, age group, city, and day can be found in Table 2. Prior to the main analysis, chi-square analyses were conducted to check whether counterbalancing was successful. This was the case: No significant difference was found between the three days,  $\chi^2(2, N = 451) = .06, p = .97$ , or between the three cities,  $\chi^2(2, N = 451) = 4.28, p = .12$ .

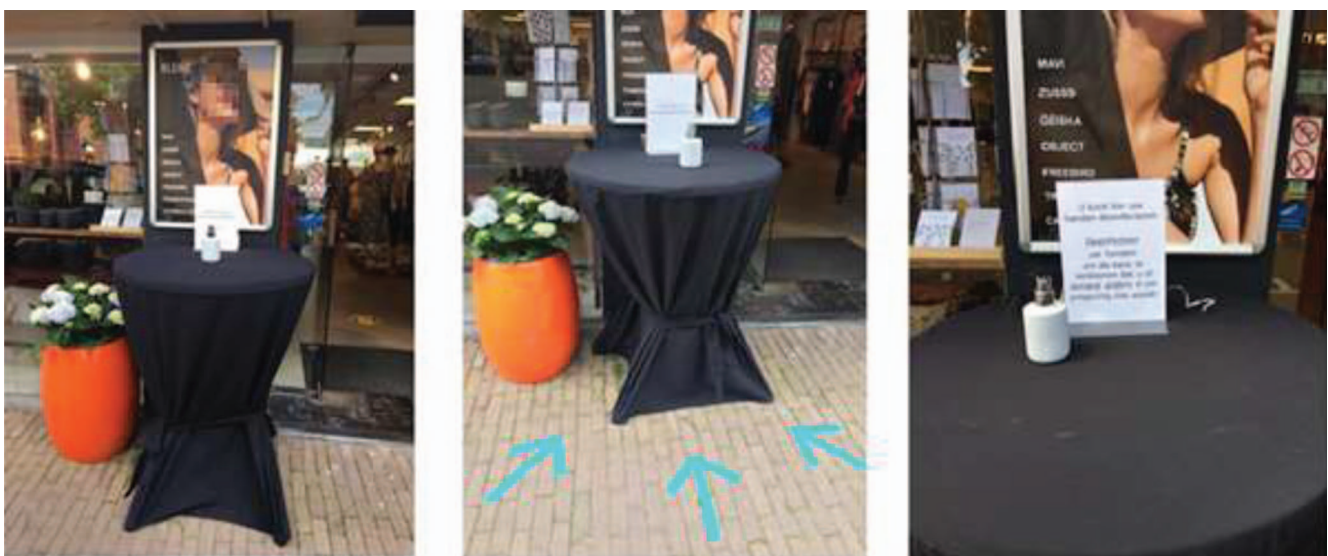
To test the effect of the nudges on hand hygiene, we used a mixed model approach, with nudge type as the independent variable and the dispenser as the dependent variable. Group was used as a random effect. Compared to the control condition, the gain frame nudge was not found to have a significant effect on hand washing (estimate = 0.59, *SE* = 1.12),  $z(4) = 0.53, p = .60$ . Similarly, the salience nudge was not found to have a significant effect on hand washing (estimate = 0.34, *SE* = 1.15),  $z(4) = 0.37, p = .71$ . In all three groups, the majority of participants did not disinfect their hands.

**Discussion**

This study used a salience nudge and a gain frame nudge to improve hand hygiene during the COVID-19 pandemic. In contrast to our hypothesis, although hand hygiene was higher in both nudging conditions compared to a control condition without nudges, this difference was not significant. These results deviate from earlier findings reported in the pre-COVID-19 period where positive effects of similar nudges on hand hygiene were found (e.g., Caris et al., 2018; D’Egidio et al., 2014; Dreibelbis et al., 2016).

One likely possibility for this discrepancy is that with the prominence of COVID-19 prevention in media and society, people are already more inclined to practice hand hygiene regularly. This

**Figure 1**  
*Experimental Setup for the Different Nudge Types*



*Note.* Control condition (left), salience nudge (middle), and gain frame nudge (right) as presented in front of the stores. See the online article for the color version of this figure.

**Table 2**

*Frequencies of Dispenser Use per Condition, Gender, Age Group, City, and Day*

Variable	Used dispenser	Not use dispenser	Total
Condition			
Control	46 (33.3%)	92 (66.7%)	138
Gain frame	71 (42.5%)	96 (57.5%)	167
Saliency	55 (37.7%)	91 (62.3%)	146
Gender			
Male	16 (35.6%)	29 (64.4%)	45
Female	156 (34.6%)	250 (55.4%)	406
Age group			
<18	19 (38.0%)	31 (62.0%)	50
18–30	62 (37.3%)	104 (62.7%)	166
31–70	87 (39.5%)	133 (60.4%)	220
70+	4 (26.7%)	11 (73.3%)	15
City			
Rotterdam (Store 1)	113 (35.4%)	206 (64.6%)	319
Middelburg (Store 2)	37 (48.1%)	40 (51.9%)	77
Halsteren (Store 3)	22 (40.0%)	33 (60.0%)	55
Day			
Day 1	53 (37.6%)	88 (62.4%)	141
Day 2	66 (37.9%)	108 (62.1%)	174
Day 3	53 (39.0%)	83 (61.0%)	136

Note.  $N = 451$ .

may have resulted in an increased baseline level of hand hygiene. In our study, about a third of all participants in the control condition (33.3%) sanitized their hands before entering the store. This baseline is substantially higher than in earlier research. For example, in D'Egidio et al. (2014) the baseline was 12.4%, and even the postintervention result, that is, practicing hand hygiene with a nudge, of D'Egidio et al. (2014) is nearly 10% points lower than our baseline.

Another explanation could be that because of the COVID-19 pandemic, people already sanitized their hands moments earlier, for example before leaving their house or when leaving a different store. This would reduce the medical necessity to disinfect at the stores in which our experiment took place and make 100% hand hygiene rate unrealistic. The strong advice regarding the behavioural regulations communicated by the government to disinfect the hands regularly likely has contributed to this. However, a majority of participants still did not disinfect their hands, meaning there is still room for other measures to improve the current baseline.

A different explanation comes from the subtleness of the intervention. Even though the observers did not systematically collect data on how participants responded to the nudges, the observers indicated that participants often did not seem to overtly pay attention to the nudge intervention or even see it. Because attention is central to the saliency nudge, it is possible that the saliency nudge on the floor was out of the line of sight, which has reduced its effectiveness (Nevo et al., 2010). The saliency nudge could have been more effective when presented at eye level, as in the study by D'Egidio et al. (2014). A lack of attention could also have been problematic for the gain frame nudge, because it means that the nudge did not get a chance to influence participants' behaviour, possibly leading to the lack of significant findings. Even if participants might have noticed the nudge, some participants might have been at too large of a distance from the sign containing the hand

sanitizing message to effortlessly read the text for the nudge to have the desired effect on their behaviour.

Last, it is possible that the usage of a dichotomous dependent variable, paired with the generally small-to-medium expected effect of a nudge intervention (Hummel & Maedche, 2019), resulted in simply not enough statistical power to reliably find an effect. Related to this, the relatively low power, combined with the fact that in the analyses we controlled for who else someone entered the store with, might have contributed to insignificant findings for the nudges even though the averages in percentage points seem to suggest a practically meaningful effect (e.g., 33.3% vs. 42.5% in, respectively, the control and gain frame nudge conditions).

Concluding, the adaptation of two earlier successful nudges and taking them from a hospital context into the shopping street did not significantly increase hand hygiene. Although this finding might lead one to think that the effectiveness of these two types of nudges does not transfer to another context, the results possibly are largely influenced by the measures taken around the COVID-19 pandemic. This study suggests that nudges that were shown to be effective in the pre-COVID-19 period may become less effective in times of crisis when hand hygiene is essential in flattening the curve in this COVID-19 pandemic. This finding suggests that other measures should be taken to further increase hand hygiene. This can be done by testing different nudges based on previous successes. For example, Pfattheicher et al. (2018) improved hand washing by presenting a poster with the image of eyes over the washing station, making people feel observed. A different approach is to combine nudges that complement each other to achieve a larger effect, such as when presenting coloured arrows at eye height to attract people's attention together with a written statement explain the gains for people. Last, other measures may rely on approaches that change behaviour in a less subtle way (e.g., active enforcement by employees, or even barring entry). These measures may even be combined with nudges to maximize effectiveness.

## Résumé

La pandémie de COVID-19 a eu d'importantes répercussions sur les populations du monde entier. L'une des mesures les plus importantes pour prévenir la dissémination du virus est la bonne hygiène des mains. Nous voyons la mise en œuvre d'incitations douces (*nudge*), technique empruntée à l'économie comportementale, comme une façon d'accroître l'hygiène des mains sans imposer de mesures obligatoires. Dans cette expérience de terrain, on a évalué deux types d'incitations douces, aussi appelées « coups de pouce », qui avaient été auparavant mis en application avec succès — une incitation par la saillance et une incitation basée sur le gain —, mais dans un nouveau contexte (c.-à-d., une rue commerçante). On a observé 419 personnes faire des emplettes durant une expérience contrebalancée dans trois magasins ayant chacun un distributeur de désinfectant accompagné d'une incitation par la saillance, d'une incitation basée sur le gain, et un autre sans incitation. Les données sur l'usage des distributeurs ont été analysées au moyen de modèles mixtes pour tenir compte des groupes entrant dans chacun des commerces. En faisant des comparaisons avec la condition de contrôle, on n'a constaté aucun effet significatif des deux incitations douces sur l'usage du désinfectant parmi les participants. Ce résultat pourrait être attribuable à l'importance accrue accordée à l'hygiène des mains depuis la pan-

démie de la COVID-19, car les données de base de notre étude pour la pratique de mesures d'hygiène pour les mains étaient de beaucoup plus élevées que dans le cadre d'études réalisées avant la pandémie. De plus, il est possible que les clients s'étaient déjà désinfecté les mains avant de quitter la maison, comme le conseillent les gouvernements. Nos résultats suggèrent que les commerces et les gouvernements devraient trouver des mesures autres que les incitations douces testées pour améliorer l'hygiène des mains dans les rues commerçantes durant la pandémie de COVID-19, en combinant plusieurs incitations ou en utilisant des moyens moins subtils.

*Mots-clés* : incitation douce, hygiène des mains, COVID-19, sailance, incitation du gain.

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