

Nudging Towards Honesty

Experimental Evidence from Achmea's Occupational Disability Insurance

E.A.G. van Gruijthuisen

ABSTRACT

This study aimed to decrease fraud in Achmea's Occupational Disability Insurance. An email was modified into four conditions: a Deterrence nudge, a Reducing Anonymity nudge, a control email as well as no email. This email was sent to clients of Achmea with an Occupational Disability insurance and an employee who was incapacitated to work. Two measures of honest claiming behavior were recorded: the response rate and the Δ Incapacitation Percentage. This is the change in the client's employee's incapacitation to work (which usually starts at 100% and decreases to 0%). Achmea funds wages for the part the employee cannot work. It may thus be tempting for the client to report a higher incapacitation percentage than the real situation. The response rate in the two nudge conditions is on average 8.75% higher than in the control email condition. (Wald test; $\chi^2 = 5.6$; $n = 386$; $p = .02$). The nudges do not affect the Δ Incapacitation Percentage. However, the covariate 'Incapacitation Percentage at Mail' suggests that if people respond to the email, they do so honestly: clients report larger changes of Δ Incapacitation Percentage if the previous percentage was high. Clients thus catch up with what the percentage should be. Therefore, as the two nudge conditions yield more responses, total honest claiming behavior increases in these conditions. Using these nudges thus leads to less fraud.

KEYWORDS

Nudging | Fraud | Insurance

1. Introduction

An Occupational Disability Insurance covers the risk of employee illness for employers. An employer is legally required to pay 70% of their employee's wages during illness up to two years, which may become a substantial financial burden. This prompts some employers to voluntarily take out insurance, if they are not willing to carry the risk.

Some insurance holders commit fraud. It could take many forms: from faking an injury to exaggerating losses (Derrig, 2002). This increases the cost of insur-

ance, which is expensive for Achmea and its honest clients.

A claim is considered fraudulent if it includes three elements: "(1) *material misrepresentation (in the form of concealment, falsification or lie)*, (2) *intent to deceive*, and (3) *aim of gaining an unauthorized benefit*" (Viaene & Dedene, 2004, p. 314). In 2017, the estimated cost of insurance fraud in Europe was €13 billion, but only €2.5 billion was detected (Insurance Europe, 2019). It is common knowledge that 10% of insurance claims are fraudulent (Tennyson, 2008; Viaene & Dedene, 2004). However, due to different

definitions and measuring methods, the real numbers could vary (Derrig, 2002). The numbers are often based on expert estimates, instead of facts. Furthermore, in inquiring experts about their fraud estimates, surveys rarely define fraud, thus inducing vagueness. Despite its limited foundation, the 10% estimate has become a staple. Achmea uses the 10% rule of thumb for occupational disability insurance fraud as well.

Fraud experts cannot detect nor prosecute all fraudsters. Prosecution is difficult, as all three elements of the definition need to be proven. This is time-consuming, so costly. A balance is struck between the cost of fraud and the cost of detecting fraud (Galeotti et al., 2020). Investigation thus occurs in a limited number of cases only, so other fraud-reducing solutions should be considered. Prevention of fraud could be one direction. In this article we explore whether theories from behavioral science could prevent fraud: the investigated technique is nudging.

2. Literature Review

Nudging, as coined by Thaler & Sunstein (2009, p. 6), is defined as *“any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid”*. Two essential characteristics of a nudge are low cost and freedom of choice. Nudging is developed to help people make the right decisions by highlighting the better option, instead of removing other options.

Insurance companies already use nudging in the purchase process. For example, statements like ‘the most picked option’ often accompany the product description on the website (see figure 1 for a depiction). This is a norm nudge. Statements describing suitable complementary insurances (e.g. an electronics insurance ac-

companying a fire and theft insurance) remind the customer to complement their purchase. This is a reminder nudge. The box to purchase this complementary insurance has already been selected: this is a default option nudge. These three nudges are listed by the author of *Nudge* as commonly used and important for policy makers (Sunstein, 2014).

In fraud reduction, nudging is not commonly used, but it has shown promising results. Shu et al. (2012) asked customers of a car insurance to report current odometer mileage. The form included an honesty declaration either at the top or bottom of the form. By positioning the honesty statement at the top of the form, the clients reported on average 10.25% more mileage. A car driven more often has a higher risk of breaking down, so insurance premiums increase with mileage. Higher reported mileage is thus a sign of honesty. The next section explores six nudges aimed at reducing insurance fraud, after which a selection for the experiment is made.

2.1. Social Norm

Multiple studies have researched the effect of a normative nudge in government communication. Two studies in the US and the UK requested to either report earnings to the state benefits office, or to pay overdue taxes. Both letters included a one-sentence nudge. In both studies, specific normative messages increased the response rate more than general normative messages did (Forehand & Greene, 2016; Hallsworth et al., 2017). Forehand & Greene (2016) doubled their response rate (from 5% to 9%) by including the phrase *“99 out of 100 people in <county> report their earnings accurately. If you worked last week, please ensure you report these earnings”*. Hallsworth et al. (2017) found a 5.1% response increase using the phrase *“Nine out of ten people in the UK pay their tax on time. You are currently in*

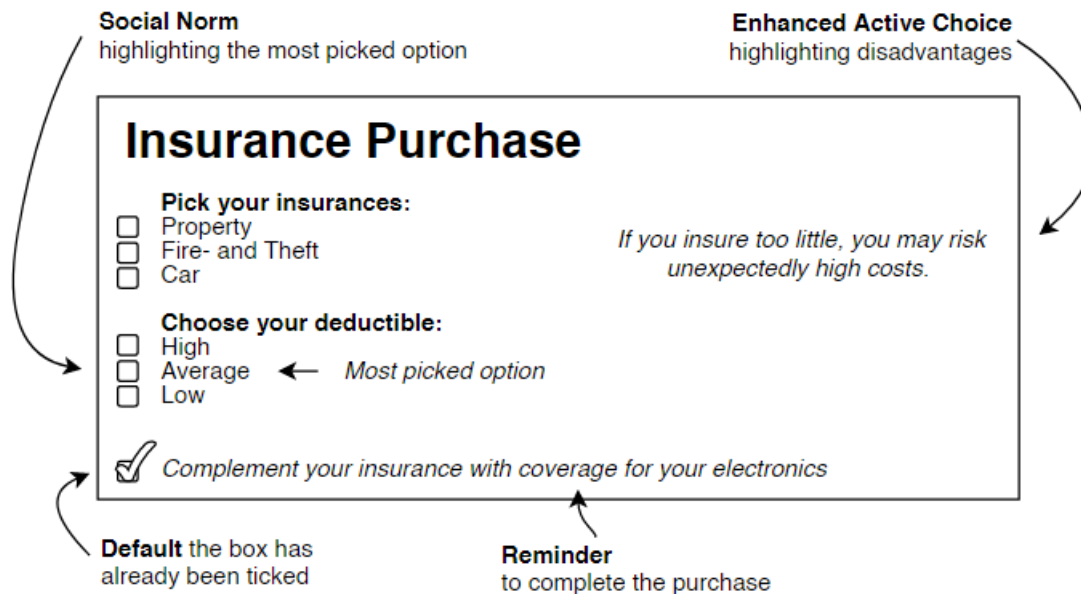


Figure 1: Examples of Nudges on an Insurance Purchase Web Page

the very small minority of people who have not paid us yet". Both of these statements use a general norm, but add details: the former study includes a location, while the latter draws on group feel. Both studies follow the three steps of norm compliance outlined by Cialdini (1989): 1) identify the social norm; 2) describe this norm as internalized by the reader; 3) point out the inconsistency between the norm and undesirable behavior. Especially the statement by Hallsworth et al. (2017) emphasizes the last step.

Although neither of these nudging studies was performed on insurance, Tennyson (1997) finds in a survey ($n = 1,987$) that in the U.S., attitudes towards acceptability of insurance fraud are influenced by peers. Torgler et al. (2007) come to a similar conclusion: their combination of surveys, lab- and field experiments finds that people commit tax evasion if their peers are evaders as well. Thus, in both institutions, norms and peer behavior are important factors in fraud. Sunstein (2014) also identifies the use of social norms as one of 10 important nudges for policy makers.

Two factors of a normative message in-

crease its effectiveness. First, it should be related to the target audience. In an attempt to reuse hotel towels, Goldstein et al. (2007) increased recycling the most with a sign stating that most previous occupants of the room had recycled the towels. This resulted in more recycling than a general norm ('most guests') or a hotel-specific norm ('most guests in this hotel'): 49% versus 35% and 44%. Thus, the most specific message performed best. Second, the norm should exceed someone's own behavior. Information about low peer compliance has an adverse effect, as this signals that the social norm apparently states to disobey the rules (Dolan et al., 2012; Lefèbvre et al., 2011).

An example of online insurance purchase will be used to illustrate all nudges. They are summarized visually in figures 1 and 2. On the web page where a customer chooses his preferred insurance options, the social norm nudge could highlight the 'most picked' option.

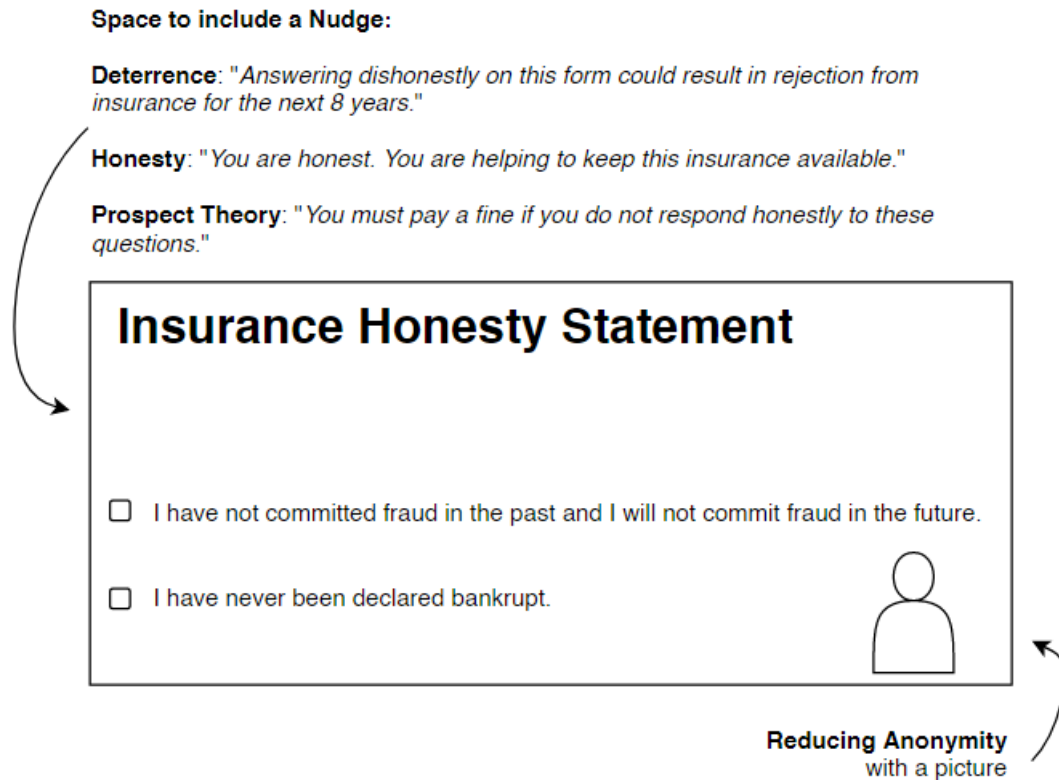


Figure 2: Examples of Nudges on an Insurance Honesty Form

2.2. Deterrence

Despite the enthusiasm about social norm nudges, other results are geared towards a deterrent tone in tax evasion experiments. Three natural field experiments towards tax evasion found comparable results by modifying the tone of their tax reminders. In Philadelphia, Belgium, and Poland, recipients responded best to a deterrence letter, compared to moral appeals, peer behavior and appeals to contribute to public goods (Chirico et al., 2017; De Neve et al., 2019; Hernandez et al., 2017). Antinyan & Asatryan (2019) find similar results. In their meta-analysis of 41 tax fraud-related articles, they find that only coercive nudges have an effect on compliance, albeit small. On the other hand, Ariel's (2012) corporate taxation research cannot confirm the effect of deterrence nudges. He does not find significant results in his research in Israel, com-

paring deterrence and morality nudges to a control letter. The conclusions from these studies thus contradict each other.

In the insurance purchase example, a good fit for a deterrence nudge would be the obligatory form confirming the client's clean slate (see figure 2). The top of the form could include 'Answering dishonestly on this form could result in rejection from insurance purchase for the next 8 years'.

2.3. Reducing Anonymity

Anonymity and lying are positively related (Conrads & Lotz, 2015), so fraud should be reduced by decreasing the level of anonymity. However, they find that partial lying is remarkably most prominent in the *least* anonymous setting. Partial lying is cheating a little bit, to make a small gain but retaining a small chance of getting caught. These findings raise the question whether fraud in relation

to anonymity takes a U-shaped curve. Is a communication channel situated in the middle of the anonymity spectrum, telephone, the most effective (Conrads & Lotz, 2015)?

In the example, a Reducing Anonymity nudge could be positioned on the obligatory insurance purchase honesty form. A picture of a contact person could make people feel watched (Oda et al., 2015), making them respond more honestly.

2.4. Honesty

People allow themselves to cheat a little bit while conserving their self-concept by conveniently ‘forgetting’ their values or by rationalizing their behavior (e.g. it is allowed to cheat because other people cheat even more). This is the theory of self-concept maintenance (Mazar et al., 2008). Reminding someone of their morals disables this behavior. Reduced ambiguity of questionable behavior makes that someone cannot justify questionable acts anymore (Gino et al., 2009): the salient norm prevents a person from neutralizing behavior. Shu et al. (2012) use this in their insurance nudging research: by repositioning the honesty statement to the top of the page, i.e. constituting the honesty norm to be more salient, they increase odometer mileage reporting with 10.25%.

Bryan et al. (2013) emphasize how to phrase this nudge: by using nouns instead of verbs (‘you are a cheater’ vs. ‘you cheat’), they found a large reduction in cheating behavior. Accusing someone’s identity has a larger effect on honesty than blaming behavior. This ties in with the theory of self-concept maintenance: it is easier to rationalize an act than your entire identity (Mazar et al., 2008).

In the example, highlighting someone’s morals on the insurance purchase honesty form may have a positive effect on honesty. This could look like: ‘*You are honest. You are helping to keep this insurance available*’.

2.5. Prospect Theory

Breit’s (2005) qualitative research found the small chance of getting caught to be a top-5 reason to commit fraud. Classic criminology theory supports the notion that a fraudulent claim is filed if the potential gain outweighs the potential punishments and probability of detection (Becker, 1968). Prospect theory describes the tendency to overestimate small probabilities (Kahneman & Tversky, 1979). Consequently, by emphasizing the probability of getting caught, the receiver is primed to overrate the chance of getting caught for fraud (Dolan et al., 2012).

On the honesty form, the insurer could highlight the risks of answering dishonestly: ‘*You must pay a fine if you do not respond honestly to these questions*’.

2.6. Enhanced Active Choice

Van Lieren et al. (2018) argue that nudges have their merit, but also their drawbacks: nudges may not provoke the commitment needed for follow-up. They propose to implement Rational Overrides: micro-moments of friction in order to provoke reaction. This fits with Kahneman’s (2011) brain mapping of two systems. System 1 is quick, but prone to biases. System 2 is for rational thinking, but slower and requires mental effort. Rational overrides stimulate system 2, while nudges seamlessly fit in with system 1 (Van Lieren et al., 2018). People may apply the same behavior when they later find themselves in a situation similar to the rational override, thanks to their conscious first decision. Nudges need to be present in all situations where the behavior is to be influenced, as system 1 does not remember previous actions (Kahneman, 2011).

The most applicable fraud reduction version of a rational override is the enhanced active choice. This is a choice, without default, pointing out the negative consequences of the undesired option. This circumvents the consequences of an

opt-in or an opt-out choice, and elevates the preferred option (Keller et al., 2011).

An example of an enhanced active choice could be found in the insurance purchase example. When deciding which insurances to acquire, a statement such as ‘*If you insure too little, you may risk unexpectedly high costs*’ highlights the disadvantages of insuring too little. The fact that people have to select each option themselves makes that they actively decide to purchase each insurance.

2.7. Conclusion

These six behavioral influencing techniques could affect honest reporting behavior. They have been inspired by previous research and behavioral theories. Social Norm and Deterrence nudges were tested in multiple experiments (Chirico et al., 2017; Forehand & Greene, 2016; Hallsworth et al., 2017). Other nudges from those experiments, such as Public Goods nudges (‘*Please pay your taxes: this funds your local school*’), have been discarded as they consistently performed less than either Social Norm or Deterrence nudges (Chirico et al., 2017; Forehand & Greene, 2016; Hallsworth et al., 2017).

Reducing Anonymity, Honesty, Prospect Theory and Enhanced Active Choice were not previously tested. The Reducing Anonymity nudge can be tested within the context of the occupational disability insurance, but not in every context. It requires the promise of a follow-up, which is not possible in large-scale experiments. Hallsworth et al. (2017) for example had a sample size of 100,000 people. It is thus possible to test more contact-related nudges within the context of Achmea than in for example tax experiments. The Honesty and Prospect Theory nudges are based on classic behavioral theories combined with cheating research. Enhanced Active Choice is based on recent insights regarding micro-moments of friction stimulating rational thinking.

2.8. Selection for the Experiment

For all six nudges, a sentence for the experiment was developed (see appendix A). However, not all nudges were selected for testing. The selection was made in cooperation with Achmea, to ensure the fit with Achmea’s communication style. Criteria were a low-effort alteration of the email, as well as a good fit with Achmea’s other communications. The Reducing Anonymity nudge was selected for the experiment as it takes little time: although it seems labor-intensive, in fact it only notifies the client of the regular course of action. The nudge states “*Als u het percentage arbeidsongeschikt niet voor <DATUM> aanpast, neem ik op <DATUM> contact met u op. Zonder uw reactie kunnen wij de hoogte van uw uitkering niet vaststellen*” which translates to “*If you do not report the incapacitation percentage before <DATE>, I will contact you on <DATE>. Without your response we cannot determine the amount of your insurance payout*”. On the other hand, the Social Norm nudge was discarded for that same reason: the sentence requires details about the proportion of a sector complying with the agreements between Achmea and the client. As the Chamber of Commerce recognizes over 1,000 sectors (Kamer van Koophandel, n.d.), it is time-consuming to specify the compliance rate for each sector.

The Deterrence Nudge was selected as it was already in use in some of Achmea’s communications, and thus fit with Achmea’s communication style. It states “*Het niet doorgeven van gedeeltelijk herstel kan gevolgen hebben voor uw uitkering. Zonder uw reactie kunnen wij de hoogte van uw uitkering niet vaststellen. Wij stoppen dan tijdelijk de uitkering*” which translates to “*Not reporting partial recovery may affect your insurance payout. Without your response we cannot determine the amount of your insurance payout. We will temporarily stop your insurance payout*”. Prospect Theory and

Enhanced Active Choice were excluded as they did not comply with Achmea’s communication style. Both statements focus on the negative consequences, but as they were not previously approved by the communications department, they were deemed riskier than the Deterrence nudge. The Honesty nudge focused on traits of the client, which is uncommon for Achmea. It was shelved as the risk of inconsistent communication was deemed too large. In total, only two nudges were allowed for testing: Reducing Anonymity and Deterrence.

3. Experiment

As prevented fraud cannot be measured, it is substituted with other measures suggesting honest reporting. The dependent variables are Response Rate and the Change in Incapacitation Percentage, because these variables affect insurance payout. A lower incapacitation percentage means less payout, as Achmea only covers the employee’s wages for the part the employee cannot fulfill his duties by labor. The goal of this natural field experiment is to find which nudge reduces the insurance payout the most, as this should contain the least amount of fraud.

In this insurance, Achmea communicates with its clients through 3 channels: the website, email, as well as telephone. The most feasible environment to test nudges is email: changing the website is a time-consuming process impossible to complete within the time frame of this research; communication via telephone is difficult to standardize and measure.

Achmea’s emails to employers (the client) cover a range of topics: from explaining the employers’ legal obligations to making a return-to-work plan for the employee. We modified the Partial Recovery email because it specifically requests employers to reply, allowing to measure response. It is sent when an occupational physician advises the employee to resume

working (partially). Achmea reminds the employer to report the new situation. As the report of partial recovery has a direct effect on the amount of insurance payout the client receives, it is thus a situation prone to fraud, as the client feels the changes in his wallet immediately.

The research question of this experiment is: *Do the Deterrence and Reducing Anonymity nudges in the partial recovery email have an effect on the response rate and incapacitation percentage for Achmea’s Occupational Disability Insurance?*

3.1. Research Design

The process of partial recovery starts with the incapacitated employee. He visits the occupational physician, who may advise him to return to work (partially). This advice is communicated both to the client and Achmea. The client implements it, and Achmea inquires with the partial recovery email whether the return to work has been successful and requests to report the new incapacitation percentage. The process repeats itself every time the incapacitated employee has an appointment with the occupational physician.

During the experiment, the partial recovery email was replaced with four conditions: a Deterrence nudge, a Reducing Anonymity nudge, no email, and a control email. The email without any nudge - the control email - is the regular procedure. The email was the same except for two nudge sentences (see appendix B). The nudge was positioned at the top of the email, following Hallsworth et al.’s (2017) example. This ensures that the message is read, as people read less details when no more relevant information is presented (Duggan & Payne, 2011). To position the nudge at the bottom of the email would thus result in less engagement with the nudge.

The no email condition entailed no contact with the client: compared to the con-

		Deterrence	Reducing Anonymity	Control Email	No Email
N		119	115	152	118
Premium (%)	μ	4.3	4.1	4.6	4.5
The ratio of total wages the client pays to the insurer	σ	2.0	2.1	1.9	2.5
Wages (€)	μ	29,766	32,491	30,485	30,983
Wages in the firm	σ	6,523	7,530	7,292	6,063
Absenteeism (%)	μ	2.9	3.6	3.1	4.4
Ratio of absenteeism in the firm over the past three years	σ	4.2	4.6	3.4	4.4
Employees	μ	14.9	28.4	18.7	29.6
Number of employees in the firm	σ	14.5	39.1	23.8	39.5
Contact Person = Employer (%)		75	60	68	62

Table 1: Demographics

μ = average; σ = standard deviation

trol email, this measures the effect of reminders. Ideally, clients respond immediately after they receive the occupational physician’s advice. If they do not, a reminder could obtain these responses.

The experiment ran for 12 weeks in March, April and May 2020. The start of the experiment preceded the COVID-19 lockdown by two weeks, hence the experiment mostly ran during the lockdown. Most sectors were required to work from home and schools closed during the pandemic. This had a large and unprecedented effect on how firms operated, including how their employees returned to work after incapacitation. The first month of the lockdown was chaotic, as no one knew how to proceed in this new situa-

tion. This later stabilized.

3.2. Participants

The participants of this experiment are clients of Achmea with an incapacitated employee who was recently advised by an occupational physician to (partially) return to work. The total sample size was 504. The demographics are summarized in table 1.

3.3. Procedure

35 Achmea agents sent the modified emails for 12 weeks. Not everyone participated for the entire data collection pe-

riod, due to new or terminated contracts, illness, or holidays. The data they generated, however, was included in the data analysis, as the clients were not aware of Achmea’s personnel changes: the response thus was not affected. Each week the agents were randomly assigned to the four conditions, with each agent assigned thrice to a condition. They sent the email when this was appropriate in the client’s timeline. On average, this was 1.39 times a week ($\sigma = 1.93$). The experimenter received the emails at the same time as the client, allowing to accurately measure response time.

3.4. Definition of Variables

The independent variable is the Nudge. It can take one of four conditions: A - Deterrence nudge; B - Reducing Anonymity nudge; C - control email; D - no email.

The two dependent variables are Response (response/no response) and the change in Incapacitation Percentage: $\Delta\%$ Incapacitation ($\Delta\%$ IC). $\Delta\%$ IC is recorded only if Response is positive and can take any value between -100% and 100%. Usually, an employee starts at 100% incapacitated, which decreases with each partial recovery report. Negative values are thus regarded as good: the employee is making progress in his return to work. Setbacks could occur, increasing the percentage again. In conclusion, the Response Rate describes whether people responded, $\Delta\%$ IC describes the content of the response.

Furthermore, Achmea collects a number of details about each employer, employee and case. These details include coverage of the insurance policy, wages of the employees, as well as the contact between the occupational physician and the incapacitated employee. The complete list of these details can be found in appendix C.

3.5. Analysis

First, the effect of the independent variable on both dependent variables is investigated. This is done with a logistic regression for Response and an ANOVA for $\Delta\%$ IC.

For each dependent variable, a dummy variable combining two of the independent variable conditions is also tested. For Response, a combination of the Deterrence and Reducing Anonymity nudges is contrasted with the control email. This investigates how the effect of both nudges together compares to the control email. The no email condition is removed to compare the nudges with the control email without the distortion of a newly created control condition: after all, the control email condition was the status quo before the experiment. The effect of this dummy variable on Response is tested with a Wald test.

For $\Delta\%$ IC, condition B and C are compared to nudge A. B and C are combined because of the positive tone of these emails, which is contrasted with the deterrent tone of Nudge A. The no email condition D is removed because no contact with the client is neither positive nor negative. The effect of this dummy variable on $\Delta\%$ IC is investigated with a t-test.

In combination with the independent variable, 39 covariates are each tested on the dependent variables. These tests are exploratory: the goal is to find out which variables affect the relationship between the independent and dependent variables. As no previous research has been done towards these covariates, no hypotheses can be drafted about the relationship between these covariates and the dependent variables. It is important however to include these variables in this analysis, as an effect could wrongfully be ascribed to the independent variable if the covariates were not tested to exclude this. The intention of these tests is to indicate which covariates should be taken into account for future research. The relationship be-

Variable	Definition	Values
IC%atMail	Incapacitation percentage at moment of sending nudge email	$0\% \leq x \leq 100\%$
Status	The internal status of each case: Actief = requires a lot of attention; Stationair = requires little attention; Initieel = undecided	Actief / Stationair / Initieel
ReportsBeforeMail	The number of partial recovery reports before the nudge email was sent	$0 \leq x \leq \infty$
WeeksIncapacitated	The number of weeks since the employee first was incapacitated to work, measured at the moment of sending the email	$0 \leq x \leq \infty$
FirstICtoReport	The number of days between the first day the employee was incapacitated to work and the date the client reported this case	$0 \leq x \leq \infty$
Employees	The number of employees at the client's firm	$1 \leq x \leq \infty$
WagestoAverage	The ratio of the incapacitated employee's wages to the averages wages in that firm	$-\infty \leq x \leq \infty$
DummyDeadline	Dummy variable whether a deadline in the email requests a response within 7 days	1 / 0

Table 2: Significant Covariates

tween the independent, moderating variable and Response is tested with a logistic regression, whereas the relationship between the independent, moderating variable and $\Delta\%IC$ is investigated with a linear regression. The regressions are each conducted twice: first, the test is completed without the interaction effect to identify the independent effects. These are the covariates that should be taken into account in future research. Then, an interaction term is added to investigate how the variables relate to each other. Thus, the first test finds which variables should be considered for further research, the second test elaborates on their direction. An explanation of the covariates generating significant results is found in table 2.

4. Results

The results of this experiment are divided into three sections. First, the main results are presented. This is followed by a section about the logistic regressions between the independent variable, the covariate and Response. The third section describes the results of the linear regressions between the independent variable, covariate and $\Delta\%IC$.

4.1. Main Results

Nudge \rightarrow Response The mean of the email response rate within seven days is recorded. The total response rate may be slightly higher, as responses after the deadline were not taken into account. The means of the response rate per condition are found in table 3. D is significantly smaller than A ($p < .001$), B ($p < .001$), and C ($p < .001$). Nevertheless, from this logistic regression does not stem that A or B is significantly larger than C or that B is significantly larger than A. We continue with the analysis comparing both nudges together with the control email. Recoding of the sent emails (excluding D - no email) to the dummy variable Nudge/No Nudge (A/B = 1; C = 0) results in significant outcomes. A Wald test finds that Nudge returns more responses than No Nudge ($\chi^2 = 5.6$; $n = 386$; $p = .02$). We can conclude that both nudges together increase the response rate more than the control email does, but we cannot draw conclusions about which nudge is best.

Nudge $\rightarrow \Delta\%Incapacitation$ An ANOVA between Nudge and $\Delta\%IC$ does not yield significant results ($p = .49$). Subsequently, we test whether the positive tone in conditions B and C outperforms the deterrent tone in condition A with a dummy variable (Positivity: A = 0; B/C = 1). This dummy variable does not find significant results either ($p = .16$). Thus, based on this data set we conclude that Nudge does not affect $\Delta\%IC$.

Conclusion Answering the research question, it is impossible to state from this study which nudge increases the incapacitation percentage the most. On the other hand, the Deterrence nudge and Reducing Anonymity nudge together increase the response rate with 8.75% on average compared to the control email condition. Together, these dependent variables affect the insurance fraud we set out to reduce. $\Delta\%IC$ decreases in each condition: so, with a higher response rate, the *total* incapacitation percentage of all clients together decreases more in the nudge conditions than in the control conditions. The calculation is Total Incapacitation = Response Rate * $\Delta\%IC$, so a higher response rate leads to a lower total incapacitation percentage (as $\Delta\%IC$ is negative, Total Incapacitation is also negative). A lower total incapacitation percentage means that the amount of each payment Achmea makes is lower, which decreases the total insurance payout. A lower total insurance payout suggests more hon-

	Response		$\Delta\%IC$
A - Deterrence	58.8 %	A - Deterrence	- 22.4 %
B - Reducing Anonymity	60.0 %	B - Reducing Anonymity	- 28.3 %
C - Control	50.7 %	C - Control	- 28.2 %
D - No Email	22.0 %	D - No Email	- 21.9 %

Table 3: Means of Dependent Variables

est claiming behavior: Achmea is highly unlikely to underpay a client - the client expects to receive a certain amount of insurance payout, and will object if he receives less than that. On the other hand, loss aversion combined with opportunistic behavior makes that most people do not object if they receive too much money (Rabin, 1998). Thus, as the nudge conditions decrease the total insurance payout, more honest claiming behavior is implied. This suggests a decrease in fraud.

4.2. Nudge + Covariate → Response

The logistic model Nudge + Covariate → Response was tested. For each of these models, the interaction effects are also reviewed. None of these models display multicollinearity above 5. In all models below, nudge D yields significantly less responses than the intercept.

Six covariates obtain significant relationships with Response in these models. None of their interaction terms are significant: thus, no interaction occurs between Nudge and the covariates. The six covariates can be divided into two groups: those that remain (marginally) significant in the interaction model and those that do not. Only two estimates remain (marginally) significant in the inter-

action model: IC%atMail and ReportsBeforeMail. IC%atMail has a negative relationship with Response: the higher the IC% is at sending the email, the less likely the client will respond. ReportsBeforeMail has a positive relationship with Response: if a client has responded more in the past, he is more likely to respond now. A correlation test confirms the negative correlation between IC%atMail and ReportsBeforeMail (Pearson’s $\rho = -0.47$; $p < .001$). In the interaction model, these variables thus retain their relationship with Response.

The other group consists of FirstICtoReport, DummyDeadline, WagestoAverage, and Employees. FirstICtoReport has a slight negative relationship with Response: the longer the time between the original incapacitation date and its report to Achmea, the less likely the client is to respond to this email. Another factor decreasing the logodds likelihood of response is WagestoAverage. If the incapacitated employee earns a lot more than his colleagues, the client is less likely to respond to this nudge email. On the other hand, including a deadline to respond within 7 days (DummyDeadline) increases the logodds likelihood of response with 0.68. A company employing one more employee than its competitor (all else kept equal) has a 0.007 higher logodds likelihood of responding. These four covariates

	Independent		Interaction			
	Effect	<i>p</i>	Effect	<i>p</i>	Interaction*	<i>p</i>
IC%atMail	-2.46	<.001	1.93	.03		
ReportsBeforeMail	0.21	<.001	0.22	.07		
FirstICtoReport	-0.01	.03	-0.02	.36		
DummyDeadline	0.68	.009	0.44	.27		
WagestoAverage	-0.46	.04	-0.19	.67		
Employees	0.007	.03	-0.009	.55		

Table 4: Covariate Estimates in Nudge + Covariate → Response

* Interaction Effects are recorded only if they are significant

generate significant results in the independent model but diffuse in the interaction model. Therefore, some sort of relation must exist between Nudge and the covariate: otherwise these covariates would still be (marginally) significant. It is likely that the interaction effect is ambiguous, making the p-values insignificant. More research is necessary to find the direction of the effect.

4.3. Nudge + Covariate → $\Delta\%IC$ Incapacitation to Work

The multiple linear regression model Nudge + Covariate → $\Delta\%IC$ was also tested. None of these models display multicollinearity above 5. Five covariates show a relationship with $\Delta\%IC$: see table 5. IC%atMail has a slightly positive relationship with $\Delta\%IC$: for each extra percent of incapacitation, the $\Delta\%IC$ will decrease with 0.002%. ReportsBeforeMail has a negative relationship with $\Delta\%IC$: for each extra report before the email, the $\Delta\%IC$ decreases with 2.4% in the current report. WeeksIncapacitated has a negative relationship with $\Delta\%IC$: with every extra week of incapacitation, $\Delta\%IC$ decreases with 0.3%. FirstICtoReport has a positive relationship with $\Delta\%IC$: for every extra day between the first day of incapacitation and the report date, $\Delta\%IC$ will increase with 0.3%. The Status Initieel

makes that $\Delta\%IC$ increases with 15%.

Interaction occurs in two of the models above. Both IC%atMail and Status influence the way the nudges interact with $\Delta\%IC$. For IC%atMail, the combination of email C and a higher IC%atMail increases $\Delta\%IC$. For Status, email C has a positive relationship with $\Delta\%IC$. However, if a case is both Stationair and receives email C, there is a *negative* relationship with $\Delta\%IC$. The three other significant models do not show interaction effects. ReportsBeforeMail, WeeksIncapacitated and FirstICtoReport each influence $\Delta\%IC$ but not in combination with the nudges. This is an expected result because these three variables all occur before the email is sent, whereas IC%atMail and Status are ongoing when sending the email.

5. Discussion

The Deterrence and Reducing Anonymity nudge conditions together thus increased the response rate of the partial recovery email with 8.75%, compared to the control email condition. The other dependent variable, the change in incapacitation percentage ($\Delta\%IC$), is unaffected by the nudges. It is however affected by the previous incapacitation percentage: a higher incapacitation percentage results in a steeper decrease of $\Delta\%IC$. This suggests that if people report a change

	Independent		Interaction*			
	Effect	p	Effect	p	Interaction	p
IC%atMail	2.154e-1	.003			IC%atMail - C: 0.399	.03
ReportsBeforeMail	-0.024	<.001				
WeeksIncapacitated	-0.003	<.001				
FirstICtoReport	0.003	.005				
Status: Initieel	0.15	.001			Stationair - C: -0.22	.03

Table 5: Covariate Estimates in Nudge + Covariate → $\Delta\%IC$

* Effects are recorded only if they are significant

in incapacitation, they report this honestly: the client catches up with what the incapacitation percentage should be. These outcomes show that the nudges positively affect honest claiming behavior: as the response rate increases, more reports of clients are up-to-date with their employee’s current ability to work. The nudges thus increase the part of total clients that receive the amount of insurance payout they deserve. In total, this means that less clients commit fraud, which was the goal of this research.

5.1. Covariates

Three covariates affect both dependent variables: 1) the number of days between the first day the employee was incapacitated to work and the date the client reported this to Achmea (FirstICtoReport); 2) the incapacitation percentage at the moment of sending the email (ICatMail); and 3) the number of partial recovery reports between the first incapacitation report and the email (ReportsBeforeMail).

The effects of these covariates exist independently from the nudges, except for ICatMail: this variable has a positive effect on the relationship between the control email condition and $\Delta\%IC$. This is due to the lower response rate of the control email compared to the nudge emails: as clients report less frequently, the gap between the old and new incapacitation percentage is larger. The client then reports a larger change in incapacitation percentage. This reaffirms that once the client responds, he catches up with what the incapacitation percentage should be. This thus confirms the finding that the higher response rate, generated by the nudges, results in more honest claiming behavior and thus less fraud. For Achmea, this is another justification to implement the nudges.

These three variables thus influence both dependent measures, so Achmea

should take their effect into account in future research. By including these variables, Achmea can ascertain that future fraud prevention results are caused by the independent variable of that study, instead of these three variables.

Independently from the Nudge variable, three covariates affect the response rate: the number of employees at a firm; the wages of the incapacitated employee compared to the wages of his colleagues; as well as a deadline in the email. The deadline was included in the draft email, but in 21% of sent emails, the deadline was removed or postponed. A deadline in the email increased the response rate with 16.3% from 43.0% to 59.3% (logistic regression, $p = .01$). Achmea could easily incorporate a deadline in all of its communications, and the positive effect on the response rate suggests Achmea should do so. It a low-cost change in the email, and clients could still choose to ignore the deadline. According to Thaler & Sunstein (2009), these are the two characteristics of a nudge. Thus, in this research, not only positive results of the Deterrence and Reducing Anonymity nudge are found, but the positive results of an unexpected variable are found as well.

The other two covariates affecting response are outside Achmea’s scope of influence. The company should monitor these variables, but further research is necessary in order to use these variables effectively in preventing fraud. The same goes for the two covariates affecting $\Delta\%IC$: the WeeksIncapacitated is outside of Achmea’s scope. The Status, although this is an internal classification defining how much support a client requires, gives ambiguous results: a case with status ‘Initieel’ affects $\Delta\%IC$ positively, but ‘Stationair’ in combination with the control email affects $\Delta\%IC$ negatively. Further research is necessary to gain understanding about its effect, in order to use it to Achmea’s advantage in fraud prevention.

5.2. Relation to the Literature

The two nudges together thus increase the response rate with 8.75% compared to the control email. In comparison to studies with a similar setting of tax payment reminder letters with short nudges, this Achmea study increases its response rate more than four comparable studies. Hernandez et al. (2017) found an 8.4% response rate increase with their deterrence/intentional choice nudge compared to a control letter. Experiments in Philadelphia and Britain found a 5.3% and 5.1% increase compared to a control letter (Chirico et al., 2017; Hallsworth et al., 2017). De Neve et al. (2019) found a 10.2% increase by simplifying the letter sent to late tax payers. However, their other experiment testing the tax population as a whole only improved the response rate with 1.04%. As Achmea already simplified its letters and sends its email to the entire relevant population, the latter De Neve et al. (2019) experiment is more comparable.

These four studies outperformed the Achmea experiment on some factors, but performed worse on others. All studies had larger samples than the current experiment. Furthermore, results were either validated by repetition or reviewed over time. However, fewer covariates were taken into account.

Overall, the current research is a good start in corporate insurance nudging reminder letter research, as to the author's knowledge this is the first experiment in its field. The effect of the nudges on the response rate thus increased honest claiming behavior and therefore reduced fraud. As these results thus have been found in tax payment literature as well as corporate insurance, it would be good to branch out to i.e. consumer insurance. Preventing fraud has the same urgency for consumer insurance as it does for corporate insurance, as the fraud estimates are the same (Viaene & Dedene, 2004). Therefore, testing the nudges of this experiment in

consumer insurance would be a good next step in using behavioral sciences for fraud prevention in this sector.

5.3. Validity

This experiment performs quite well on both internal and external validity. Internal validity was warranted by randomization, blinding and checking for moderators. The Achmea agents were randomly assigned to a nudge condition, even though each agent was assigned thrice to a condition to prevent unbalanced conditions. The participants in this research were not aware that they took part in it. Nearly all moderators tracked by Achmea were tested and only a few were found to be of influence.

Factors threatening the internal validity were the slight differences between the sent emails, demographics, as well as repeated participation in the experiment. As each email was sent by hand, some were tweaked. For example, in 21% of sent emails, the deadline was removed or postponed to suit the client. This has influenced the results. Fortunately, it confirmed that including a deadline increases the response rate. Another factor threatening internal validity is the demographics: the four conditions had some differences in demographics. The results could consequently have been due to these differences. However, the covariate regressions do not confirm this, so the results are thought to be caused by the nudges. Some clients also participated twice in the experiment. Although this weakens the internal validity, this is common practice for Achmea and strengthens external validity.

The external validity is quite robust. The experiment was conducted in a real setting, and repeatability should be high as its results compare to other studies. However, longitudinal results were not studied and therefore we do not know whether these results change overtime.

COVID-19 may have affected the re-

search: the experiment preceded the pandemic by two weeks, and thus the results later in the experiment may be different from those first two weeks. However, identifying and testing the five distinct phases of the experiment did not return significant results. (ANOVA with $\Delta\%IC$: $p = .27$; logistic regression with Response: Phase 1 - regular: $p = .92$; Phase 2 - COVID-19 chaos: $p = .63$; Phase 3 - working from home: $p = .69$; Phase 4 - holiday: $p = .57$; Phase 5 - back to school: $p = .20$). The conclusions thus may very well resemble those in a pandemic-free situation. Repeating this experiment will rule out the last bit of uncertainty.

5.4. Limitations

Although this research was optimized within constraints, some changes could have improved it. First, the choice of nudges was done quite quickly and there was no time to revise this decision. Looking back, it would have been better to test a third nudge instead of no reminder. This

would have provided more new information. The phrasing of the nudges is also subjective: there is no proof that a differently worded Deterrence or Reducing Anonymity nudge could obtain the same results. Third, it is probable that a selection bias was present during the experiment. Not all Achmea agents provided the same number of cases each condition. This may have been due to preferences: they could have sent more nudge emails in the weeks they were assigned that condition.

5.5. Future Research

Nudges thus have great potential in insurance communications. It is suggested to repeat this study for different types of insurance. It would also be good to investigate whether the Reducing Anonymity nudge collects the same results in for example taxation, as it has not yet been tested in that context. In conclusion, nudging has beneficial results for Achmea as it is successful in preventing fraud, while remaining low-cost and low-effort.

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6. Appendices

Appendix A. Nudges

Tested Nudges

1. Deterrence

Het niet doorgeven van gedeeltelijk herstel kan gevolgen hebben voor uw uitkering

Zonder uw reactie kunnen wij de hoogte van uw uitkering niet vaststellen. Wij stoppen dan tijdelijk de uitkering.

2. Reducing Anonymity

Als u het percentage arbeidsongeschikt niet voor <DATUM> aanpast, neem ik op <DATUM> contact met u op

Zonder uw reactie kunnen wij de hoogte van uw uitkering niet vaststellen.

3. Control Condition: no nudge

4. No email

Developed Nudges

1. Honesty

Doordat u eerlijk bent kunnen wij de verzuimverzekering aanbieden

Het percentage arbeidsongeschikt op tijd doorgeven helpt bij een goede verzekering.

2. Prospect Theory

Mogelijk wordt uw claim gecontroleerd op fraude

Zo houden we de verzekering beschikbaar voor iedereen.

3. Enhanced Active Choice

Een onnodig lange ziekmelding kan tot premieverhoging leiden

Bij het vaststellen van uw nieuwe premie nemen wij het verzuimpercentage mee.

4. Social Norm

<9> van de 10 mensen in <BRANCHE> geeft het juiste percentage arbeidsongeschikt door

Met de juiste informatie kunnen wij u goed helpen.

Appendix B. The Nudge Email

<Goedemorgen/Goedemiddag> <MENEER/MEVROUW> <WERKGEVER>,

Uw arbeidsongeschikte werknemer <meneer/mevrouw> <naam werknemer> bezocht op <datum> het spreekuur van <bedrijfsarts/consulent> <naam>.

<OF>

Wij spraken elkaar op <datum> over de ziekmelding van <naam medewerker>. U vertelde mij dat <medewerker> mogelijkheden heeft voor <MOGELIJKHEDEN>.

Wilt u het percentage arbeidsongeschikt voor <DATUM=1WEEK NA MAIL> aanpassen?

Uw werknemer is volgens de <bedrijfsarts/consulent> per <DATUM> gedeeltelijk arbeidsgeschikt. <Optioneel het specifieke advies van de bedrijfsarts>.

<NUDGE>

U past het percentage arbeidsongeschikt aan op <MELDPUNT>

Gebruik de knop “(Deel)herstelmelding toevoegen”. Bij de berekening van het deelherstel houdt u rekening met het aantal gewerkte uren en de waarde van het uitgevoerde werk. Een rekenhulp met toelichting ontvangt u in de bijlage.

Past u het percentage ook aan als het weer wijzigt?

Als u het percentage actueel houdt zien wij of het herstel volgens plan verloopt.

Laat het mij ook weten als het herstel vertraging oploopt

Samen bespreken we de knelpunten. Ook bepalen we de vervolgactie.

Voor vragen belt u ons algemene nummer: <TELEFOONNUMMER>

U bereikt ons van maandag tot en met vrijdag tussen 8.00 uur en 18.00 uur. Kan mijn collega u niet direct helpen? Geef dan uw vraag door. Ik bel u zo snel mogelijk terug. Natuurlijk mag u mij ook mailen: <e-mailadres>

Met vriendelijke groet,

Appendix C. List of Covariates

Variable	Definition	Response	$\Delta\%IC$
Day of the Week	The day of sending the email (e.g. Thursdays)		
Phase	Categorical variable describing 5 distinct phases of the COVID-19 pandemic: 1) regular work; 2) Corona chaos; 3) working from home; 4) holiday; 5) back to school		
Achmea agent	Employees of Achmea who sent the emails		
Location	One of two office locations		
DOctoMail	Number of days between the doctor's appointment and the email		
Brand	One of four relevant insurance brands		
WeeksIncapacitated	The number of weeks since the employee first was incapacitated to work		-0.003***
FirstICtoReport	The number of days between the first day that the employee was incapacitated to work and the date the client reported this to Achmea	-0.01*	0.003**
IC%atStart	Incapacitation percentage at start of case		
IC%atMail	Incapacitation percentage at moment of sending email	-2.46***	2.154e-1***
PreviousReporttoMail	Days between the previous partial recovery report and nudge email		
ReportsBeforeMail	The number of reported partial recoveries before the email was sent	0.21***	-0.024***
Reports	Number of reports completed within 7-day response time frame		
Product	4 variables which together describe the type of insurance product the client has		
Service	Categorical variable: the level of service Achmea provides		
Status	The internal status given to each case		'Initieel' 0.15**
Premium	Premium a client pays		
Doctor	One of three type of doctors working with Achmea		
LegalForm	Legal form of the firm		
ProvinceFirm	Province of the client's firm		
InsuranceContract	Duration of insurance contract		

Variable	Definition	Response	$\Delta\%IC$
Employees	The number of employees a company employs	0.007*	
AvWages	Average wages		
SDWages	Standard deviation of wages		
Absenteeism	Average absenteeism of firm over 3 years		
Contact=Employer	Dummy whether contact person is employer		
GenderEmployer	Gender of the employer		
GenderCP	Gender of the contact person		
Age	Age of incapacitated employee		
EmploymentEmployee	Length of employment incapacitated employee		
Wages	Wages of incapacitated employee		
WagestoAverage	The ratio of the incapacitated employee's wages to the average wages in that company	-0.46*	
ProvinceEmployee	Province of employee		
Positivity	Dummy whether the tone of an email is positive		
DocAdvice	Dummy whether tangible doctor's advice is included in the email		
DummyDeadline	Dummy whether a deadline of 7 days is included in the email	0.68**	

Significant Values in the Regressions

*** $.001 \leq p$; ** $.001 \leq p < .01$; * $.01 \leq p \leq .05$