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Combining Digital Nudges In a Charity Context: Increasing Donations or Sense of Manipulation?

Kristoffer Bergram
University of Neuchâtel, kristoffer.bergram@unine.ch

Abdessalam Ouaazki
University of Neuchâtel, abdessalam.ouaazki@unine.ch

Manon Berney
Institute for Information Management, manon.berney@unine.ch

Valéry Bezençon
University of Neuchâtel, valery.bezencon@unine.ch

Adrian Holzer
University of Neuchâtel, adrian.holzer@unine.ch

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Completed Research

Kristoffer Bergram
École Polytechnique Fédérale de Lausanne (EPFL)
1015 Lausanne
kristoffer.bergram@epfl.ch

Abdessalam Ouaazki
University of Neuchâtel
2000 Neuchâtel
abdessalam.ouaazki@unine.ch

Manon Berney
University of Neuchâtel
2000 Neuchâtel
manon.berney@unine.ch

Valéry Bezençon
University of Neuchâtel
2000 Neuchâtel
valery.bezencon@unine.ch

Adrian Holzer
University of Neuchâtel
2000 Neuchâtel
adrian.holzer@unine.ch

Abstract

With charitable donations moving online, digital nudges can play a role in influencing donation behaviors. While digital nudges can increase online donations, it is unclear how they affect donor behaviors and perceptions in combination. This paper aims to address this open research gap by exploring the effects of several digital nudge combinations (i.e. default, friction, and social norms) on user donation behaviors and investigates users' ethical concerns (mainly the sense of manipulation). The results of an online factorial experiment with 794 participants show that combining several nudges tends to increase user donations. However, friction is the main driving factor. Furthermore, our results show that nudging users increases their sense of manipulation, which increases their likelihood of regretting their donation. This is an important finding in a charitable giving context, where organizations rely upon a positive user experience to produce recurring donations.

Keywords: Digital nudging, Default, Friction, Social norms, Online charitable giving

Introduction

In 2023 alone, Americans gave away roughly 557 billion dollars to charity and about 67% of that came from private individuals (Giving USA Foundation, 2024). The act of donating to charities is increasingly performed through digital channels. Large charities already deploy various kinds of nudges to elicit donations online (Ruehle et al., 2021). Nudges in pro-social domains, such as charity, are unique in that they are often aimed at steering people's behavior in the direction of some kind of charitable or public welfare, rather than private welfare (Hagman et al., 2015). As digital nudges become more pervasive in several application domains, users become more likely to be exposed to several nudges at the same time, the effects of which require more research (Shore and Cummings, 2022).

While previous studies have investigated nudging in the charity donation context (Altmann et al., 2019; Capraro et al., 2019; Chakraborty et al., 2019; Everett et al., 2015; Gråd et al., 2021), offering significant contributions to several facets of charity-related nudging, they rarely investigate the systematic effects of mixing or combining several nudges at once. While some recent studies investigate combinations of digital nudges, these studies have been conducted across diverse application domains such as e-commerce (Ingendahl et al., 2021), health (Sengupta et al., 2020), energy-saving behaviors (Charlier et al., 2021), privacy and security (Qu et al., 2023; Shore and Cummings, 2022), and social media (Kim and Dennis, 2019). Because of the diversity of both their design elements and their application contexts – it is challenging to paint a comprehensive picture of how various nudge combinations relate to users' online donation behaviors.

Online donations are a special domain in the sense that there is an inherent trade-off between the clear altruistic act of donating to charities vs. just keeping our monetary resources for ourselves (Capraro et al., 2019). To the best of our knowledge, no study has so far investigated the potential interactions between digital nudges in this pro-social context. It is therefore not clear whether combinations of nudges will positively impact altruistic behaviors such as donations or backfire and thereby steer users in the opposite direction.

In this paper, we use three common digital nudge patterns (Bergram et al., 2022; Hummel and Maedche, 2019) and investigate the interactions of their combinations related to users' online donation behaviors. We perform this evaluation in a pro-social context with real monetary stakes i.e. where users give away a real portion of their earnings. We also explore several ethical dimensions of these digital nudge combinations from the user's perspective. In a recent review article, Clausen et al. (2022) highlights that additional outcome measures (apart from the immediate behavioral outcome) such as various cognitive or emotional strains on the user should be considered when designing persuasive technologies. While digital nudges have attracted more and more attention from researchers in recent years, Susser and Grimaldi (2021) point out that existing empirical research investigating the effectiveness of digital nudges and targeted recommendations tends to neglect other ethically relevant effects on users. This raises relevant empirical questions around users' perspectives on how or why they are being nudged in particular directions (Susser and Grimaldi, 2021). Furthermore, the potential answers to such questions have implications for charity organizations counting on these users for their funding and ultimately laudable impact.

Related Work

Below, we outline previous work that has investigated different digital nudge combinations, the relationship between nudging and ethical considerations, and various knowledge gaps that remain related to these areas.

Combining Digital Nudges

Online users are increasingly likely to be exposed to several digital nudges simultaneously and several previous scholars have called for more research that investigates the potential combinations of digital nudges (Bergram et al., 2022; Mirbabaie et al., 2023; Shore and Cummings, 2022). Several recent examples of nudge interaction studies ranging from application contexts privacy (Shore and Cummings, 2022), health (Sengupta et al., 2020), or e-commerce and marketing (Ingendahl et al., 2021) can be found in the literature.

However, these interaction studies have shown mixed results in different application contexts. There is evidence suggesting that combining several distinct nudges on top of each other yields a larger effect in terms of behavior change across several application domains (Charlier et al., 2021; Ingendahl et al., 2021; Kretzer and Maedche, 2018; Wessel et al., 2019). For example, in the context of online grocery shopping, scholars have investigated combinations of defaults and social nudges and shown that when combined, they can lead to a stronger impact on compliance with product recommendations than each nudge individually (Ingendahl et al., 2021). Kretzer and Maedche (2018) have shown that a variety of social nudges can moderate each other in the context of a business information system (BIS). They relied on a feature for report recommendations (that employees were recommended to read through an adjacent link) that utilized various social cues for the recommendation itself. Examples of social nudges included institutional proximity to the user that provided the report recommendation and social hierarchy i.e. whether the person who recommended the report was an intern, manager or director. Their results indicated that social nudges

in this context moderated each other's efficacy. One example was that the acceptance rate for reports from interns was increased with institutional proximity, but this was not true for report recommendations from directors (Kretzer and Maedche, 2018). In the context of crowdfunding, researchers have revealed significant interactions between social nudges and the amount of discount present for various backer options (Wessel et al., 2019). These two design cues, discounts and the number of backers for a given reward option are common features on crowdfunding platforms, and the effect of a given discount seems to be moderated by the popularity of a given project in this application domain (Wessel et al., 2019). In the context of online privacy, researchers have investigated two-way and three-way combinations of default, friction, and social nudges on user consent screens (Shore and Cummings, 2022). Shore and Cummings (2022) investigated how the above nudges influenced users' tendencies to disclose their location data in an online experiment. While they did not uncover a consistent interaction pattern between these digital nudges, they did conclude that the effect of friction seemed to be dependent on the presence of other design elements (Shore and Cummings, 2022). In another recent study aimed at steering users towards greener fashion products in an e-commerce scenario, the results suggested a backfiring effect from employing a combination of digital nudges (Mirbabaie et al., 2023). This pertained to default and social nudges specifically. Another study on energy-saving behaviors among employees suggests that using a single nudge in that context had no effect. In contrast, combining three different nudges on top of each other had complementary effects in terms of pro-environmental behaviors (Charlier et al., 2021).

Findings like these indicate potentially relevant interaction effects for a variety of digital nudges across several application domains. Yet, taken together, previous studies do not form a conclusive picture of when certain digital nudges interact, or if these effects can be extrapolated to pro-social contexts such as online donations. Our first objective is to investigate this intersection of digital nudge combinations and online charitable giving behaviors. This leads to our first exploratory research question:

RQ1: How do digital nudge combinations affect user *behaviors* in a charity donation context?

Ethical Concerns with Digital Nudging

In broad terms, nudging entails interventions that steer people in a particular direction while still allowing them to go their own way (Sunstein, 2015c). Thaler and Sunstein (2008) underscored that when nudging was applied, it should make people better off, as judged by themselves. The general discussion around the ethics of nudging often boils down to two principal concerns: autonomy (Hausman and Welch, 2010; Vugts et al., 2020) and manipulation (Ruehle et al., 2021; Sunstein, 2015a; Sunstein, 2015b; Sunstein, 2016; Wilkinson, 2013).

It is important to explore these ethical concerns in relation to combinations of digital nudges for both practical and theoretical reasons. On the practical side, charities need to know whether the combination of several nudges might have an adverse impact on potential online donors. Combining several nudges intuitively entails more persuasive pressure on users (Charlier et al., 2021). However, backfiring effects have already been documented for single digital nudges (in the form of reminder emails) in the context of online fundraising (Damgaard and Gravert, 2018). There is also recent evidence that combinations of several nudges could potentially backfire (Mirbabaie et al., 2023), at least in the context of steering users towards more sustainable products. On the theoretical side, numerous empirical studies suggest a relevant relationship between users' sense of autonomy, manipulation, and the efficacy of single nudges. To illustrate, Gråd et al. (2021) compared defaults, social norms, and moral commitment nudges to increase donations towards UNICEF. In this context, only some of the investigated nudges increased the proportion of users donating. Yet, the positive effects of the nudges (i.e. the increased tendency to donate) seemed to be driven by the users who did not perceive the nudges as attempts to manipulate their donation behavior, while donations among users who perceived the nudges as manipulative remained unaffected (Gråd et al., 2021). Additionally, their results indicated that the above nudges (which were compared to each other but not combined) did not crowd out charitable giving to any extent. In another study, default nudges seemed to undermine people's sense of autonomy when choosing between a hypothetical set of health insurance programs (Arvanitis et al., 2022). This applied to situations where there were only three health insurance programs to choose from, but when this set was increased to nine potential insurance programs, the drop related to people's autonomy was no longer significant. In contrast, Michaelsen et al. (2021) conducted three experiments to examine threats to autonomy from default nudges. Their findings concluded that default nudges did not lead to a lower perception of autonomy or choice satisfaction on average.

This remained true even when the presence of the default nudge was overtly disclosed to users (Michaelsen et al., 2021). So, while single nudges, especially defaults, seem not to be associated with threatened autonomy or a sense of manipulation, it is still unclear what happens when several nudges are combined in a pro-social context. This leads to our second exploratory research question:

RQ2: How do digital nudge combinations affect user *perceptions* in a charity donation context?

System Design

To investigate the combination of digital nudges in the context of charitable donations, we designed a system inspired by the interface of a tipping UI of a mainstream mobile app. This interface allowed to design and combine three common nudge patterns in one unique interface. These patterns are a default nudge, a friction nudge, and a social nudge (See Figure 1).

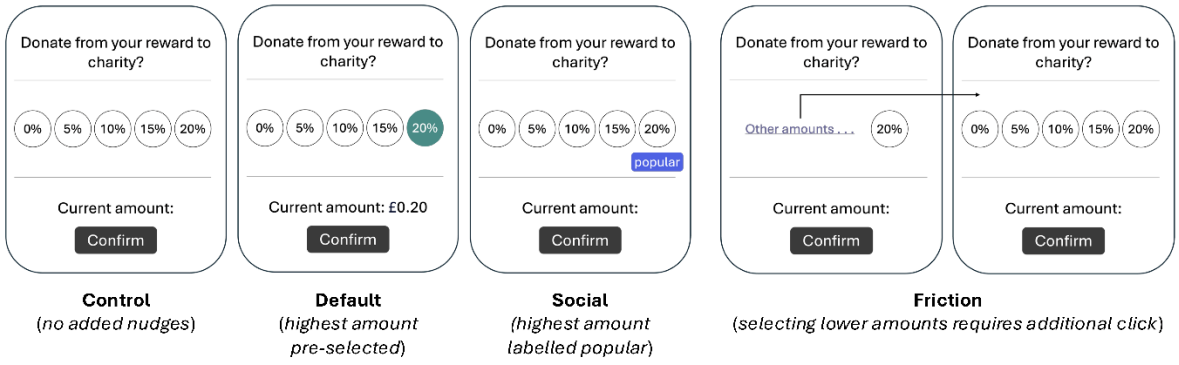

Figure 1. Donation UI with instances of Default, Social, and Friction nudges.

Default Nudges. Default nudges entail changing the choice outcome users will get by design if they do not explicitly request otherwise (Brown and Krishna, 2004). Several review articles across conventional and digital nudging have labeled defaults as one of the most effective tools for behavior change (Jachimowicz et al., 2019; Mertens et al., 2022). Psychologically, the reason defaults work is often explained by the status quo bias (Samuelson and Zeckhauser, 1988), meaning that when people are faced with choices, they tend to stick with the present state of affairs rather than change the outcome. Also, several previous studies indicate that defaults alone can increase charitable giving contributions (Everett et al., 2015; Ghesla et al., 2019; Zarghamee et al., 2017).

In our system (Figure 1), the default nudge is simply a pre-selection of the 20% option indicated by its green color. If a user clicked *Confirm* when the default was present, the pre-selection will be their donation amount. The *Current Amount* was updated based on what the user selected, and when default nudges were present in the UI, this amount was pre-set to £0.20 as in Figure 1. It should be noted that the user was only able to *Confirm* the donation with a single click if, and only if, a default was present in the UI. If no option was pre-selected or selected in the UI, and the user tried to click *Confirm*, the user would be prompted again to select an amount.

Friction Nudges. While changing the default option can strongly impact choice outcomes, another element of design that can influence outcomes is to change the option-related effort - also known as friction (Mertens et al., 2022). Friction is a two-edged sword in terms of design because while it can guard against various user mistakes, it can also create user frustration and disengagement (Cox et al., 2016). An example of friction being applied in the digital domain can be found in Kim et al. (2019) who designed an app-level lockout task for smartphone users to discourage certain apps from being used. In a 3-week study, users were faced with the friction of inputting a random sequence of digits to access various apps in their phone related to Internet browsing, social media, or entertainment. This type of design friction discouraged about half of users from accessing some of their phone apps (Kim et al., 2019).

In our system (Figure 1), the friction nudge puts all the alternatives (except the 20% option) two more clicks away. That is, if friction is present and the user wants to donate less than 20%, they will need to first click *Other Amounts…*, and then select their desired donation option as shown in Figure 1.

Social Nudges. In short, social design elements provide users with social reference points that reduce situational ambiguity and uncertainty (Mertens et al., 2022). While there are many nuances as to how these social norms are established through design, the tendency to follow the social cues of others seems to drive behaviors in several application contexts. Social nudges have been successfully used in pro-social contexts, such as large-scale decreases in households' energy use (Allcott and Kessler, 2019), there are also several examples where they fail as an intervention (Osman et al., 2020).

Previous studies suggest that descriptive vs. injunctive social norms tend to be more effective at changing behaviors because they imply less of a threat to autonomy and freedom than injunctive social norms (Melnyk et al., 2022). Social norms are considered injunctive when they indicate what people should or should not do on moral grounds, and descriptive when they simply indicate typical behaviors of some relevant reference group and signal which behaviors are most popular (Melnyk et al., 2022). In our system (Figure 1), the social nudge is the blue badge under the 20% option, labeling it as the *Popular* choice.

Evaluation Setup

To explore our two research questions, the evaluation was designed as an online factorial experiment where participants were randomly allocated to one of eight possible conditions with one of the following nudge patterns: Control (no added nudges), Default (Def.), Friction (Fri.), Social (Soc.), Def.+Fri., Def.+Soc., Fri.+Soc., Fri.+Soc.+Def. The participants were instructed that in the first part of the study, they could donate a part of their reward (i.e. £ 0.00-0.20 GBP) to the International Committee of the Red Cross (ICRC) and that the second part was focused on the design of charity apps. At this stage, the participants were not aware that the study was focused on digital nudging. Figure 1 shows the four first patterns (i.e., Control, Def., Fri., Soc.). The UIs were made with JS and CSS modifications directly in Qualtrics. The study was cleared by the University of Neuchâtel ethics board.

Before the main data collection, we also conducted three pilot benchmarks (n = 104, n = 102, n = 101) with the control UI, where we tested different amounts as donation options. This was to ensure that the donation amounts were properly scaled to avoid a context where everyone would give away all of the preset portion, or nobody would give away anything. Based on these pilots, we settled on a design where the amounts ranged between 0% – 20% because the average and median donation amount in this design was close to the middle option. If this is used as a benchmark, it allows for both increases and decreases in donation amounts. Participants from the pilot benchmarks could not participate in the main study.

Measures

After the informed consent screen, an attention check was deployed, and participants were given a commitment request. On the subsequent screen, participants received a short introduction to the work of the ICRC as a charity. After this information, participants were randomized to one of the eight conditions, where they could select a donation amount and subsequently were asked to respond to a series of scale items. Below we detail the main measures captured in the study.

Donations. This measure was operationalized on two different levels to capture various aspects of users' donation behaviors: donation amount and compliance. The donation amount pertains to the button option a given user pressed (0% – 20%) and then confirmed in the UIs. The unit of the donation amount can be conceived of as either a relative percentage (%) of the participation reward or as British pence (£/100). Compliance is operationalized as a dichotomous variable (0/1), one (1) means that the user was steered in the direction of the nudges and donated the highest amount i.e. 20%. A zero (0) means that the user took another path than what the digital nudges suggested (0% – 15%). From this measure, a compliance percentage can be derived for each of the nudge patterns.

Attitude towards Charitable Organizations (ACO). The items for this scale were adopted from Webb et al. (2000). These five items constitute one of two dimensions of a larger construct aimed at determining people's propensity to donate to charitable organizations (Bearden et al., 2011). In our study, this variable is used as an attitudinal control measure. In a random presentation order, users responded to these items on

a 7-point Likert scale. An example item from this scale would be: "My image of charitable organizations is positive". In our study, the internal consistency reliability of this scale was (Cronbach's α = .908.).

Perceived Threat to Autonomy. This scale was adapted from Dillard and Shen (2005). This scale is also referred to as "Threat to freedom" in the literature, but we have opted for the current label in line with Roubroeks et al. (2011). Users were presented with a 7-point Likert scale on each item. To illustrate, an item from this scale could be: "The design threatened my freedom to choose." This scale is well-suited for our study as it directly addresses the potential feeling of restricted decision-making that users might experience. The scale had an acceptable Cronbach's α at .878.

Perceived Sense of Manipulation. The items for this scale come from Witte (1994). Users were presented with a 7-point Likert scale, where we again revised our items to focus on the design rather than a message. A concrete item from this scale would be: "The design tried to manipulate my feelings". This scale was selected because of its common usage when capturing perceptions related to persuasion (Ratcliff 2021). The Cronbach's α coefficient for this scale was .915.

Changed Donation Decision. Toward the end of the study, all users were reminded of their previous donation amount and explicitly asked if they wanted to either keep (0) or change (1) their previous decision to donate this particular amount. This action is a proxy measure for regret. Eyal (2022, p. 1) refers to this as a "regret test" for users.

User Experience. Finally, users who were exposed to one of the UIs containing digital nudges were asked to textually describe the difference between that UI and the control UI with no digital nudges. Before describing them, users were shown images of these two UIs.

Participants

We aimed to gather one hundred participants for each of the eight experimental groups. The participants for the experiment were drawn from Prolific and directed to an anonymous Qualtrics link. They were selected using the following screening criteria: UK sample, Approval Rate >= 95%, usage of a laptop/tablet, and Google Chrome web browser. The screening criteria were used to minimize device and browser compatibility issues related to the UI designs. It took the median participant approximately 5 minutes to complete the study ($\hat{m} = 4.95, \hat{\sigma} = 3.13$). The sample consisted of 49.9% females and participant ages ranged between 18 and 78 years old ($\hat{\mu} = 41.42, \hat{\sigma} = 12.82$). Each study participant was compensated £0.80-1.00 GBP for their participation (depending on their donation to the ICRC). In total, 805 participants completed the main study. Out of these, we removed three participants who failed the attention check, and eight participants because their browsers were not linked to a desktop device (e.g. iPhones), resulting in 794 valid responses. The randomization procedure was deemed successful because we detected no systematic differences regarding sex, age, or attitudes toward charitable organizations (ACO score) between the experimental groups that would not be expected by chance. While modest, the pilot tests and the main study raised a total of 96.44 GBP, subsequently donated to the ICRC.

Evaluation Results

In the next sections, we will provide detailed inferential analyses addressing research questions 1 and 2. Table 1 summarizes the donation amounts across all nudge patterns.

More Nudges, More Donation? (RQ1)

The average donation amounts are visualized when the data are aggregated across the number of nudges in the UIs (i.e. 0, 1, 2, 3) in Figure 2 A). This figure suggests an increase in donation amounts when the number of nudges increases in the UI, especially when comparing three nudges to the control group.

Figure 2 B) shows the average donation amounts across each specific nudge pattern in the UIs (i.e. default, friction, and social). The main trend in Figure 2 B) is that donation amounts increase when friction is present in the UI.

			Compliance	Donation Amount*				
Conditions	**No. of nudges**	***n***	**(\%)**	**∑**	***m***	***μ***	***σ***	**~**
Control (no nudges)	0	95	28.42	830	10.00	8.74	8.19	
Default (Def.)	1	97	32.99	870	5.00	8.97	8.57	
Friction (Fri.)	1	98	50.02	1205	20.00	12.30	8.56	
Social (Soc.)	1	102	22.55	790	5.00	7.75	8.10	
Def. + Fri.	2	100	54.00	1195	20.00	11.95	9.24	
Def. + Soc.	2	102	36.27	970	10.00	9.51	8.80	
Fri. + Soc.	2	100	39.00	975	10.00	9.75	8.92	
Def. + Fri. + Soc.	3	100	63.00	1340	20.00	13.40	8.96	

Table 1. Descriptive statistics for compliance percentage and donation amounts across conditions.

Summary statistics for sums (∑), medians (m), averages (μ), std. deviations (σ) and actual distribution (~)
*All donation amounts are in British pence (£/100), and have been rounded to two decimals

More Friction, More Donation? (RQ1)

To further test the patterns shown in Figure 2, we specified three multiple logistic regression models with compliance (0/1) as the dependent variable. The choice of using this dichotomous dependent variable was due to the fact that the donation amount had a bimodal distribution, see Table 1. This result and the implications of this choice will be examined in the Discussion and Limitations sections respectively. The models control for users' ages and ACO scores. These two predictors were mean centered to aid interpretation.

In the first model, we added the number of nudges as dummy variables with indicator coding. This model connects to the results shown in Figure 2 A). Model 2a and 2b connect to the results shown in Figure 2B). In Model 2a, the number of digital nudges was exchanged for every specific nudge pattern. Model 2b complements Model 2a by accounting for the subsequent interaction terms of the nudge combinations.

The first model indicates that, on average, when only one nudge is added (regardless of what it is), the odds of complying (donating the highest amount) relative to the control group do not change. Two nudges have a suggestive effect, with users being almost twice as likely to comply with the nudges ($OR_{Adj.}$ = 1.944, W= 6.242, p = .012) compared to the control group. When three nudges are added, the odds of complying compared to the control group is almost four times higher ($OR_{Adj.}$ = 3.898, W = 18.128, p < .001). The second model corroborates the results seen in Figure 2 B). The model highlights that users who were exposed to three of the nudge patterns were significantly more likely to comply with these nudge combinations and thereby donate higher amounts on average, see Table 2. This was true for Fri., Fri.+Def. and Fri.+Def.+Soc. However, the common denominator suggested by both Figure 2 B) and Model 2b is that friction alone is the driving factor of increased donations. Model 2b shows that this is the only significant predictor, indicating that users who were exposed to a nudge pattern that contained friction were almost three times more likely to comply (ORAdj. = 2.791, W = 10.416, p =.001) while controlling for other factors. Furthermore, Model 2b suggests no interaction effects from any particular combination of the default, friction, and social nudges related to compliance.

More Nudges, More Manipulation? (RQ2)

The previous section showed that compliance percentage and donation amounts go up with more nudges, especially when friction is present. Here, we investigate the user perceptions (threats to autonomy and

sense of manipulation) when adding nudging to the interface. Results for both measures are closely aligned and we only detail one of them, namely the sense of manipulation, for conciseness.

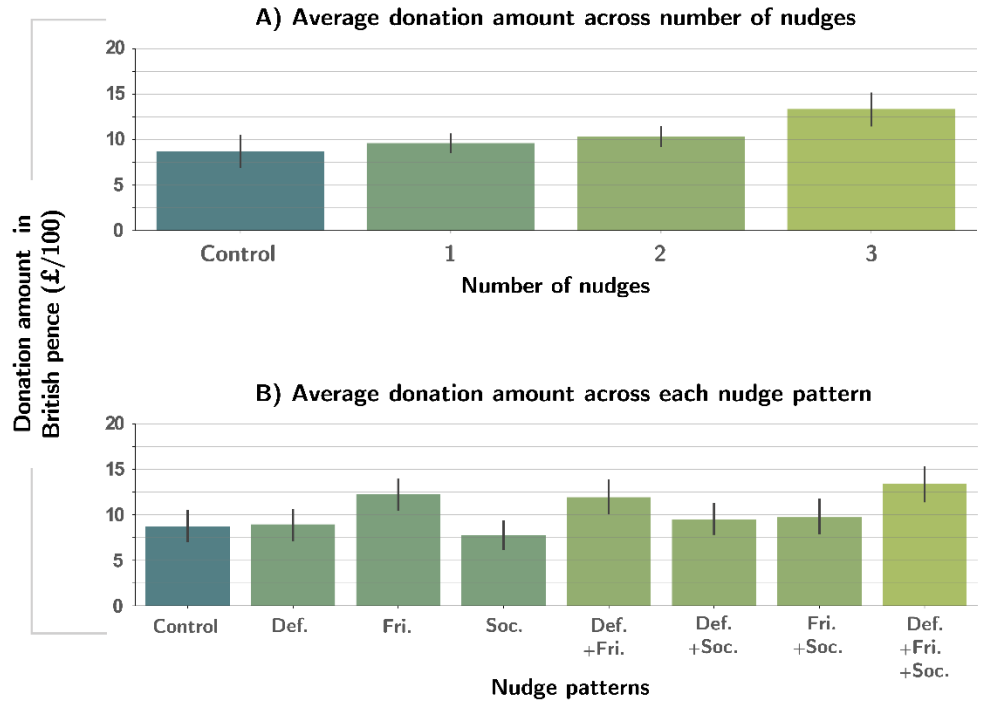

Figure 2. Barchart A) shows the average donation amount across the number of nudges combined in the UI. Barchart B) shows the average donation amounts across each specific nudge pattern (n = 794). The whiskers in all subsequent bar charts indicate 95% mean confidence intervals.

Figure 3 A) highlights the relationship between users' sense of manipulation across the number of nudges. It shows that as soon as nudges are present in the UI, the sense of manipulation increases on average. A Mann-Whitney U-test indicates a significant difference for the median sense of manipulation between the control group ($\hat{m}$ = 2.00, n = 95) and all the groups that were exposed to various nudges ($\hat{m}$ = 3.33, n = 699), U = 22952.0, Z = -4.887, p < 0.001, r = 0.309.

Figure 3 B) shows the relationship between compliance and the sense of manipulation collapsed across all of the nudge patterns. As a follow-up, we looked at the differences in the sense of manipulation for users that complied vs. did not comply with each of the nudge patterns, and the results of these Mann-Whitney U-tests are shown in Figure 3 B). A trend emerges – the sense of manipulation is particularly high among users who do not comply with different combinations of friction nudges.

More Manipulation, More Regret? (RQ2)

Finally, across the whole sample, only 27 users (≈ 3.4%) changed their donation amounts at the end of the study. There was no clear association between the nudge patterns and this decision χ^2 (df = 7, n = 794) = 1.827, p = 0.969. While the number of users here is admittedly small – when the donation amount was changed, there are clear differences between users who changed their donation and those who did not in terms of perceived sense of manipulation, see Figure 4.

	Regression model parameters			
	β	‡$OR_{Adj.}$	[95% CI]	Wald
Model 1: Reference category for each dummy variable is the control group				
Control (β0)	-0.985***	0.397		17.269
Age	0.024***	1.024	[1.012, 1.036]	15.502
ACO score	0.488***	1.629	[1.418, 1.872]	47.261
†Number of nudges: 1	0.373	1.452	[0.858, 2.458]	1.934
†Number of nudges: 2	0.665*	1.944	[1.154, 3.274]	6.242
†Number of nudges: 3	1.360***	3.898	[2.084, 7.292]	18.128
Model 2a: Reference category for each dummy variable is the control group				
Control (β0)	-0.992***	0.371		17.379
Age	0.023***	1.024	[1.011, 1.036]	14.377
ACO score	0.523***	1.687	[1.460, 1.950]	50.130
†Default	0.282	1.326	[0.697, 2.522]	0.740
†Friction	1.026**	2.791	[1.496, 5.205]	10.416
†Social	-0.290	0.749	[0.382, 1.466]	0.713
†Default + Friction	1.225***	3.406	[1.826, 6.353]	14.842
†Default + Social	0.290	1.336	[0.711, 2.509]	0.810
†Friction + Social	0.460	1.584	[0.845, 2.970]	2.058
†Default + Friction + Social	1.358***	3.889	[2.075, 7.291]	17.945
Model 2b: Reference category for each dummy variable is its own absence				
Control (β0)	-0.992***	0.371		17.379
Age	0.023***	1.240	[0.671, 2.293]	50.13
ACO score	0.523***	1.240	[0.671, 2.293]	47.261
†Default	0.282	1.326	[0.697, 2.522]	0.740
†Friction	1.026**	2.791	[1.496, 5.205]	10.416
†Social	-0.290	0.749	[0.382, 1.466]	0.713
†Default + Friction	-0.083	0.920	[0.387, 2.191]	0.035
†Default + Social	0.297	1.346	[0.540, 3.351]	0.407
†Friction + Social	-0.277	0.758	[0.310, 1.857]	0.367
†Default + Friction + Social	0.402	1.495	[0.434, 5.144]	0.407

Table 2. Predictors for the likelihood to comply with the digital nudges (i.e. donate the highest amount) in the multiple logistic regression models.

* $p < 0.05$, ** $p < 0.005$, *** $p < 0.001$
†Dummy variable with indicator coding (e.g. 0/1)
‡Adjusted odds ratios, with all other variables held constant in the model

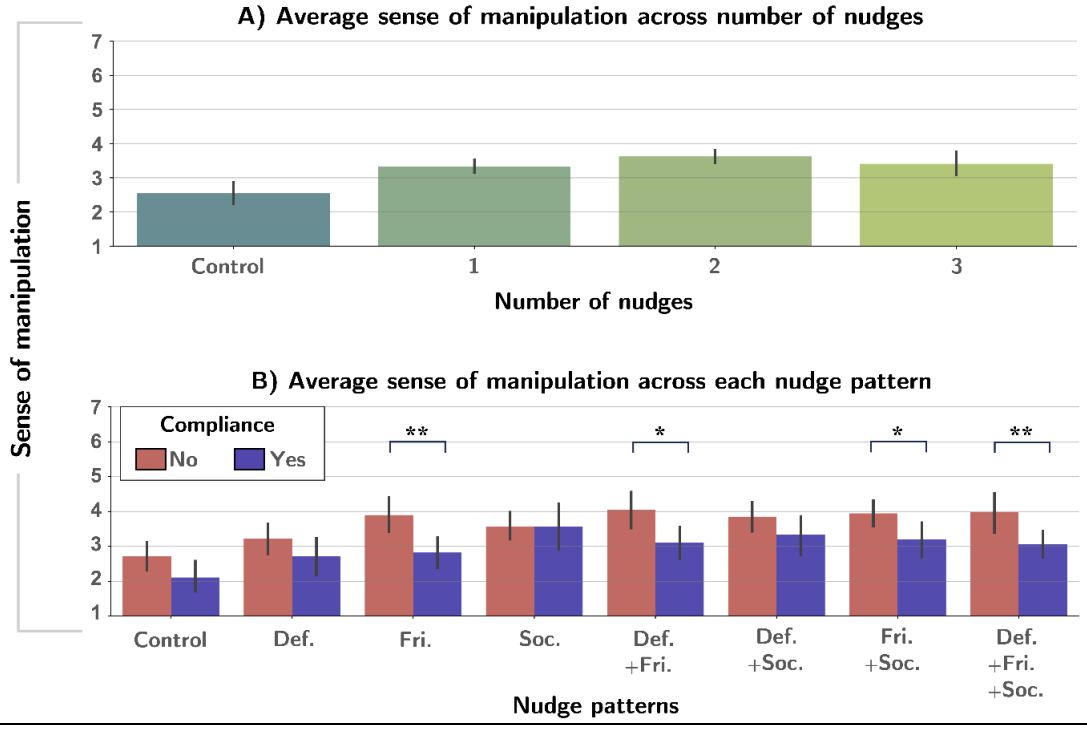

Figure 3. Barchart A) shows the average sense of manipulation across the number of nudges and bar-chart B) shows the average sense of manipulation across each nudge pattern clustered on compliance (n = 794). Mann-Whitney U-tests indicate differences between the compliance clusters (No/Yes) within each nudge pattern (* p < 0.05, ** p < 0.005, *** p < 0.001). These tests were performed without using a family-wise error correction, i.e., (αE /1).

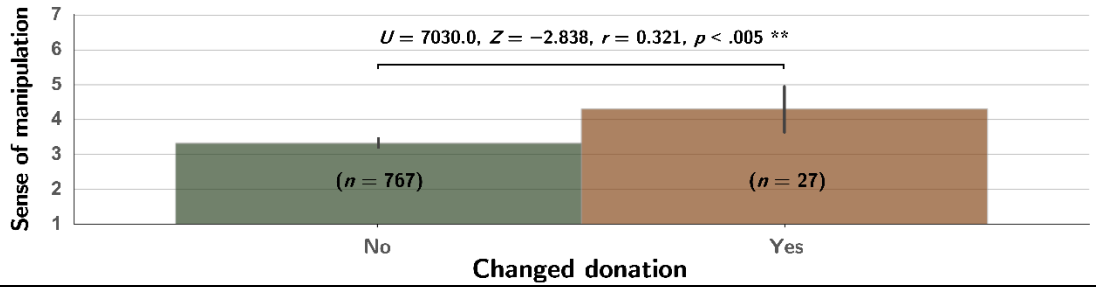

Figure 4. Barchart shows the average perceived sense of manipulation clustered on those who stayed with their donation decision (No), and those who changed their donation amounts (Yes). A Mann-Whitney U-test indicates a difference between these clusters (No/Yes) related to median manipulation.

Qualitative Analysis

In this section, we take a more detailed look at the user experience associated with the nudge patterns. Our goal is to get a better understanding of users' self-reported perceptions of the different nudge patterns. This content analysis was conducted through a systematic process involving two of the researchers. First, both researchers independently read through all comments once, and manually coded 70 randomly selected

comments (≈ 10%), then engaged in discussions to identify initial codes (Boyatzis, 1998). A first set of 39 agreed codes was then independently applied to another 70 randomly selected comments by each researcher. The inter-rater reliability between the two researchers was assessed after this initial round using Cohen's Kappa (k = 0.648), indicating moderate agreement (Landis and Koch, 1977). After the initial coding, four of the co-authors gathered to (1) combine similar codes into more coherent ones and (2) identify additional codes to better capture users' descriptions. For example, we merged the codes pushy and forced into a single code pressure and introduced the nudge_preference code. After this process, our codebook included a total of 21 codes. The two researchers who initially coded the comments now coded all comments together using the refined codebook. At the end of the process, the two researchers conducted a final round of independent coding using the final codebook by re-sampling another 70 random comments. Cohen's Kappa was again calculated (now at k = 0.803), signifying almost perfect agreement. Finally, four of the researchers engaged in discussions to establish the following four main themes.

Feeling Exploited by Design. The first theme that emerged from our analysis relates to a feeling of trickery and manipulation expressed by many participants, most of whom were exposed to nudge combinations with friction. Some participants simply stated they felt manipulated by the nudge. For instance, participant P87 (Male, 47)$_{\text{Def.+Fri.}}$ wrote: *"the [Control] one leaves you to make your own decision. the [Def.+Fri.] one tries to manipulate you."*, and P421 Female (53)$_{\text{Fri.+Soc.}}$ stated: *"[Fri.+Soc.] is manipulative and attempting to force donations."*. Others associated the feeling of manipulation with a reduction of choice caused by the nudge. For example, P614 Female (33)$_{\text{Fri.}}$ noted: *"Design [Fri.] feels a bit more manipulative in that it makes you feel like 20% is the amount most other people choose by making it the only option viewable on the screen. [...]."* and P623 Female (49)$_{\text{Fri.}}$ wrote: *"[Fri.] only displaying the largest % that can be donated this will impact some users who are not able to understand if they have options"*. Finally, some participants also pointed out the potential backfire effect of employing such a technique in a charitable giving context. For instance, participant P127 Male (52)$_{\text{Fri.}}$ stated: *"The [Fri.] design is counting on people not working out how to change the amount donated - I find it covertly manipulative. I donate a lot of money to charity but through my own free will rather than as a reaction to pressure."* and P627 Female (58)$_{\text{Def.+Soc.}}$ commented: *"The popular feature is often used by online stores such as VPN/antivirus sellers to steer a user into buying a more expensive product. I'm not sure if a charity would want to resort to that unless really desperate for funds. It might raise a bit more but at the expense of reputation."*.

Reactions to Perceived Pressure. The second theme that emerged from the analysis reflects participants' reactions to the pressure they felt from the nudges. It is worth noting that most of these participants were in the Social group. Some participants stated that they felt pressured by the nudge, with for example participant P578 Female (63)$_{\text{Soc.}}$ commenting: *"Minimal, but pressurizing"* and P196 Male (21)$_{\text{Soc.}}$ writing: *"I think is a bit too pushy for my liking."*. Some participants linked the pressure to a sentiment of guilt for not being able to comply with the nudge. For example, P695 Male (47)$_{\text{Soc.}}$ wrote: *"I think [Soc.] could make people feel guilty if they weren't able to commit to that amount, the feeling of guilt could make people uncomfortable enough to leave without pledging anything."*, and P243 Male (36)$_{\text{Fri.}}$ stated: *"[Control] lets you pick how much without any pressure at all, whereas [Fri.] selects the highest amount automatically you feel a bit guilty changing it lower."*. P624 Female (52)$_{\text{Soc.}}$ pointed out the fact that the nudge allows for less freedom of will: *"[Control] lacks the "popular" tag, allowing more discretion and expression of free will than [Soc.]."* Finally, some other participants questioned the truthfulness of having the highest amount selected, with for example P72 Female (35)$_{\text{Def.+Soc.}}$ commenting: *"[Def.+Soc.] leaves you puzzled if it's true that 20 percent is most popular donation. You feel pressured to donate."* and P450 Male (41)$_{\text{Soc.}}$ noting: *"suggesting a random number is popular is not credible. Best to leave that out and allow the user to decide what they can afford"*.

Dispassionate Description of Design. Another theme that was generated from analyzing participants' comments comprises dispassionate descriptions where they simply described the visual appearance of the interfaces. It is worth noting that most of these participants were in the Default group. In this regard, participant P375 Male (75)$_{\text{Def.}}$ indicated: *"[Def.] is suggesting the maximum"*, and participant P456 Female (27)$_{\text{Def.}}$ wrote: *"One has the 20% option pre-selected, while the other doesn't have any option selected"*. A small proportion of participants from the Social group simply described the popular option under the nudge, with for example participant P286 Female (45)$_{\text{Soc.}}$ mentioning *"Design [Soc.] has an option to see popular donations"* In the Friction group, participants described the nudge pattern as limiting their choice, with for

example participant P287 Female (30)Fri. noting: *"The [Control] design gives you the options straight away without having to look for them"*, and participant P531 Male (49)Fri. writing: *"For [Fri.] you have to physically click on the donation amount to change it, but the other has the different amounts to just choose."*. When several nudges are combined, participants usually do not describe all of them; instead, they tend to focus on a specific nudge. For example, participant P95 Female (43)Def.+Fri.+Soc. wrote: *"[Control] gives you options straight up the other you need to click on 'Other Amounts' to see what other options are available"*, and participant P416 Male (27)Def.+Soc. commented: *"[Def.+Soc.] indicates the most popular reward to charity advising to pick the highest percentage"* and participant P274 Female (41)Def.+Fri. noting: *"The donation portion is different, [Control] shows all the percentages the other doesn't"*.

Choice Facilitation. Several participants, although a minority, mentioned that the nudge they were exposed to facilitated their donation choice. For instance, participant P137 Female (44)Def.+Fri.+Soc. expressed finding the nudge pattern simple and helpful: *"The [Def.+Fri.+Soc.] option offers a suggestion on how much to donate, as a user I find this to be helpful rather than manipulative. [Def.+Fri.+Soc.] options have a simple and easy-to-use design."*, and participant P153 Male (38)Def.+Fri.+Soc. wrote: *"The [Def.+Fri.+Soc.] is simple and direct, using it is easy. Design [Control] has more options on the screen so you feel you have more choice.* Other participants stated that they preferred the nudge design because it offered a convenient amount to donate, such as participants P124 Female (53)Def.+Fri.+Soc. who wrote: *"[The control] provides the user with a greater level of freedom to make a decision. I prefer [Def.+Fri.+Soc.] as the default position is an appropriate level of donation to make"*. Another participant, P140 Female (35)Def.+Fri.+Soc., stated they preferred the nudge design because they found it more decisive: *"I think option [Def.+Fri.+Soc.] feels more convenient, it's more decisive. I would imagine the longer you have time to make your choice perhaps the less you would donate."*. Additionally, participant P221 Female (29)Def.+Fri.+Soc. explained they found the nudge pattern to be more appealing: *"the [Def.+Fri.+Soc.] one is user friendly as it has real money amount in the percentage so that you don't have to sit and work it all out. [...]. the [Def.+Fri.+Soc.] one is way more appealing"*.

The themes regarding users' self-reported perceptions of the nudge combinations will be discussed together with the other findings of the evaluation in the next sections.

Discussion

In this study, we explored the effects of nudge combinations in a charitable giving context (RQ1). In particular, we explored the effects of combining default (Def.), social (Soc.) and friction (Fri.) nudges on user donation behaviors and perceptions. Apart from just measuring the behavioral impact from the nudge combinations, we echoed the point that it is important to consider additional perspectives from users when designing digital nudges (Clausen et al., 2022; Michaelsen et al., 2021; Susser and Grimaldi, 2021). We also explored the relationship between these nudge combinations and users' sense of manipulation (RQ2). Additionally, our qualitative analysis of user comments unveiled several insights about users' perceptions of these nudge combinations.

Digital Nudges and the Specificity of the Charity Context

Compared to commercial contexts such as e-commerce, online charities might afford a lesser degree of skepticism from users given their pro-social aims. Previous researchers have argued that employing nudges is ethically permissible, even when the autonomy of the potential donor might be threatened if this alleviates the suffering of victims affected by life-threatening events (Ruehle et al., 2021)[1]. Yet, this ethical salience may also be contributing to a user experience of unwanted pressure to donate (the qualitative analysis highlighted several such comments). This suggests a potential paradox: While certain online charities can justify the use of various nudges – employing them may lead to a heightened sense of psychological reactance among users because not complying with a nudge might generate more guilt or shame compared to a context that lacks ethical salience such as e-commerce. This potential paradox suggests that great care should be taken when employing nudges in an online charity context. In this vein, future research could aim at disentangling the contexts in which nudges are perceived as choice facilitators and those in which they are more negatively perceived by certain users.

[1] This argument certainly applies to charities that help victims of armed violence or war, such as the ICRC.

There is also a procedural argument for designing nudges with caution in the context of online charitable giving: While the short-term effectiveness of one or several nudges is comparatively easy to quantify via donation revenues, the long-term backfiring effects related to unwanted pressure or perceptions of manipulation are harder to measure. To address this, future research could investigate how to design adequate digital interfaces that encourage donations while mitigating negative perceptions. In particular, the effect of the interface on warm glow and the overall relationship between the charity and the donor could be systematically explored.

Digital Nudges, especially Friction, can increase Donations

When aggregating users' donations on the number of nudges present in the UI, our results suggest that combining nudges does have an additive impact on donations and users' tendency to comply with the nudges when compared to no added nudges (control). This is in line with prior research investigating other contexts that indicate that combined nudges can yield larger effects than nudges individually (Charlier et al., 2021; Ingendahl et al., 2021; Kretzer et al., 2018; Wessel et al., 2019).

Yet, once we account for interaction effects, our results suggest that the friction nudge (putting the lower donation options only two clicks away) is the driving factor of donation compliance. More specifically, in our experiment, only three interventions significantly increased the likelihood of compliance which increased the subsequent donation amounts compared to the control group, namely: Fri., Fri.+Def., and Fri.+Def.+Soc..

As such, our findings suggest that the friction nudge is the main driver of behavior and that the social and the default nudges are not effective without the friction nudge. The failure of the social nudge to drive behavioral change in our study is aligned with a recent review on backfiring effects from behavioral interventions, which suggested that instances of social norms or comparisons were the most common intervention resulting in failures (Osman et al., 2020). This potential backfiring effect was echoed in our qualitative analysis where many reactions to perceived pressure were reported in the groups with a social nudge present. As such, our findings suggest some caution when it comes to adding a social nudge in this context.

When it comes to the use of defaults to encourage donations, the literature offers mixed findings. Some findings in charity contexts, like ours, report no effect of only default nudges (Altmann et al. 2019), whereas others found that defaults alone could be effective (Ghesla et al., 2019; Goswami and Urminsky, 2016). Some of the defaults that are effective in charity contexts resemble what we refer to as friction nudges (cf. Everett et al. (2015) and Zarghamee et al. (2017) operationalization of default nudges). Indeed, in these settings, the user needs to expend some degree of effort to opt out of the default. On the contrary, our default nudge only requires a click to opt out, which could explain its limited effect compared to our friction nudge. Also, our qualitative data analysis suggests that choice facilitation (only one choice visible) with the friction nudge was a possible driver and was appreciated by several users.

Digital Nudges, Effective or Not, Will Increase Sense of Manipulation

System designers interested in increasing donations should also evaluate the potential effect that nudges could have on user perceptions beyond their immediate behavior, to consider the broader impact on the relationship with the donor. Our second research question investigated this issue by looking at the effects of these nudge combinations on user perceptions, specifically the sense of manipulation.

Our findings show that all nudge patterns (except the single default) are associated with an increased sense of manipulation compared to the control group. That is, on average, introducing most of these nudge combinations comes with a heightened sense of manipulation. The least problematic nudge pattern in terms of manipulation from users' perspectives seems to be the default nudge (alone), which is in line with some previous research (Gråd et al., 2021; Michaelsen et al., 2021). Nudge combinations that involve social or friction elements seem more problematic. Our qualitative analysis offers perspectives for understanding the increased sense of manipulation resulting from these nudges. While some participants stated that they felt manipulated because the nudges reduced their freedom of choice, others felt pressured due to feelings of guilt or shame induced by the nudges.

Furthermore, users who refused to follow the choice suggested by the nudge tended to also experience the most negative perceptions in terms of manipulation. It should be noted that although the sense of manipulation tended to increase with the nudge patterns compared to the control group–the average remained below 4 on a 1-7 scale for all of them. That is, on average, the sense of manipulation did not pass the halfway mark on the scale for any of the nudge patterns. This raises important questions that future researchers could investigate. First, do digital nudge combinations differentially affect the perception of manipulation in a charity versus a commercial context? Second, would a higher perception of manipulation due to more impactful digital nudges reduce donation compliance in a charity context? Future research could explore different types of nudges in various contexts to better understand the perceived level of manipulation and its effect on behavioral compliance.

Moreover, even though only a small amount of participants regretted their donation to the point that they took the opportunity to change their donation amount at the end of the study ($\approx$ 3.4% of users), our findings do suggest that the decision to change the donation amount was associated with a higher sense of manipulation. This offers important implications for charities that employ digital nudges. Indeed, our findings suggest that employing digital nudges can trigger negative perceptions among potential donors especially when they fail to increase donations. As such, charitable organizations should be particularly careful when introducing such design elements and focus on the ones that produce an effective behavioral outcome. In addition, charitable organizations should also evaluate the cost of using multiple nudges in terms of relationship-building with the donor. The sense of manipulation due to the nudges could directly affect users' willingness to develop a relationship with the organization. In addition, donors usually experience an emotional reward following a donation, called the warm glow (Crumpler and Grossman 2008). This added value could also be negatively affected by the increased sense of manipulation or a threat to autonomy. The loss of a warm glow could also afflict the relationship, decreasing future donations. This cost is even larger for users who resisted the nudge and did not comply, who experienced the most negative perceptions after they were exposed to the nudges. When using nudges, charitable organizations can increase donations but may at the same time alienate users who did not donate. Those may be even less likely to donate in the future. If these findings are further corroborated, charitable organizations need to weigh if the short-term increase in donations is worth the loss of potential donors in the long term.

Limitations

The present article has several limitations that may be addressed by future research. First, one limitation of our study relates to the geographical location of participants, as they were all recruited from the UK, which might limit the generalization of the findings. Second, the design space that we covered for investigating our nudge combinations is very limited. That is, there are a great many other ways to design various donation options, pre-selecting them (default), toggling the choice-related effort to reach some options (friction), and using various social design cues to guide behaviors (social). Our designs explored a specific area on this landscape where digital nudges were combined to steer users towards donating the highest amount (20%) from a set of options, without the possibility to exceed this maximum amount. Variations of our designs could be further assessed in future research. Third, the monetary options that we used in our evaluation are very small (0-20 British pence). Based on previous research it is not clear exactly how this may influence our findings. Small stakes may play a role in our inability to detect an effect from some of the nudge combinations, but a meta-analysis on the topic of stake sizes suggests that, in the aggregate, small stakes should still provide a reasonable approximation of donation behavior (Larney et al., 2019). Moreover, while the dichotomous compliance measure (0/1) effectively addressed the bimodal distribution of donations, it may overlook variations in intermediate donation amounts and reduce the sensitivity of our analysis.

Conclusion

With online donations taking up an increasing proportion of charitable giving, we investigated the impacts of digital nudge combinations on users' charitable giving behaviors and their subsequent effects on users' perception of these designs. We designed and evaluated a solution that combined default, friction, and social nudges. Our evaluation suggests that combining nudges did have an impact on donations and users' tendency to comply with the nudges, but once we account for interaction effects, friction appears to be the driving factor for increased donations. However, our evaluation also indicates that nudge combinations increase users' negative perceptions related to manipulation, especially for those who resist the nudges.

These results suggest that charitable organizations should use nudges to increase donations with caution, as they appear to be donation behavior catalysts in the short term, but as they can be associated with these negative perceptions, they could act as donation blockers in the long run.

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