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Who can be nudged? Examining nudging effectiveness in the context of need for cognition and need for uniqueness

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Abstract

In the last decade, there has been a growing research focus on the subtle modifications of choice architecture that have strong effects on consumer behavior and are subsumed under the term nudging. There is still little research, however, on how different nudges influence individuals with different personality characteristics. An experimental online shopping scenario is used to test whether a customer's Need for Cognition and Need for Uniqueness moderate the effectiveness of two of the most prominent nudges—defaults and social influence. Two experiments with samples stratified by age, gender, and education (total N = 1,561) reveal that defaults and social influence have the predicted impact on a customer's decision. Across both studies, nudge effectiveness was partially impacted by Need for Cognition and not impacted at all by Need for Uniqueness. These findings imply that both types of nudges are strong and robust techniques to influence consumer decision-making and are effective across different levels of consumer's Need for Cognition or Need for Uniqueness.

1 | INTRODUCTION

In the last decades, a vast amount of research has examined the influence of small modifications in the choice architecture on consumer choice behavior, a concept commonly referred to as "nudging." The term "nudge" was popularized by the bestseller "Nudge" by Richard Thaler and Cass Sunstein and can be 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" (Thaler & Sunstein, 2008, p. 6). Many different interventions and techniques derived from research in psychology, behavioral economics, information systems, and other disciplines can be subsumed under this broad definition, such as defaults, social influence, warnings, reminders, or simplifications, just to mention a few (Sunstein, 2014). In the specific context of influencing consumer choice behavior, online retailers may want to use these nudges to push customers into buying specific products, for example, environmentally friendly products (Demarque, Charalambides, Hilton, & Waroquier, 2015).

Despite the relevance of nudging for consumer choice behavior and their wide-spread implementations in practical settings, there is still only few research on whether the effectiveness of these nudges depends on an individual's personality (Jung & Mellers, 2016; Otto, Clarkson, & Kardes, 2016; Stutzer, Goette, & Zehnder, 2011). However, the study of personality is relevant for both, practical and theoretical purposes:

From a practical standpoint, a moderation by personality would indicate that for specific subgroups of individuals nudges may be ineffective (e.g., Thunström, 2019). In extreme, for certain subgroups nudges could even backfire, leading to an outcome opposite than intended. As an example, Thunström, Gilbert, and Ritten (2018) studied interindividual differences in expense aversion. They found that people who were chronically low in experiencing pain when spending (i.e., cost insensitive) did not normalize their spending behavior when being exposed to an opportunity cost reminder nudge. Furthermore, for individuals who were chronically high in experiencing pain when spending (i.e., cost sensitive) the nudge backfired, leading to even more restrictive spending behavior than typical for such individuals.

Thus, interindividual differences were responsible for the absence or even the backfiring of a nudging effect. Indeed, a growing body of research shows that sometimes nudges remain ineffective (e.g., Dimant, van Kleef, & Shalvi, 2020; John & Blume, 2018; Myers & Souza, 2020; see also Sunstein, 2017) or even backfire (e.g., John & Blume, 2018; Liu, Gao, & Agarwal, 2016; Marreiros, Tonin, Vlassopoulos, & Schraefel, 2017; See, Valenti, Ho, & Tan, 2013; Wilson, Bogomolova, & Buckley, 2015). Overall, there is huge variation in nudging effects (Hummel & Maedche, 2019; Jachimowicz, Duncan, Weber, & Johnson, 2019). One reason for such unstable, ineffective, and backfiring nudges could be the influence of personality traits. Thus, studying the effect of personality could identify potential pitfalls when applying certain nudges for specific subgroups. It could also show how nudging interventions could be customized to the individual's personality in order to have a stronger impact on consumer behavior.

However, the study of personality is also important from a theoretical perspective. The cognitive processes underlying nudges are still a matter of debate (e.g., Dinner, Johnson, Goldstein, & Liu, 2011; Hertwig & Grüne-Yanoff, 2017; Marchiori, Adriaanse, & De Ridder, 2017). Whether a nudging effect is moderated by a given personality trait would therefore shed further light on why nudges yield compliance. We will outline this in the following section.

2 | RESEARCH ON NUDGING

Over the last years, some nudges have received significantly more attention in research and application than others. A current review on nudging suggests that defaults are the most popular nudge with most articles focusing on them (Hummel & Maedche, 2019). However, the same review also shows that social influence nudges only fall shortly behind in number of studies over the last years (Hummel & Maedche, 2019). Overall, both defaults and social influence can be seen as two of the most prominent nudging techniques (Thaler & Sunstein, 2008). Beyond their prominence, these two nudges are also of particular theoretical interest in context of personality, as we will argue in the remainder of this article. The present research therefore elaborates on the effectiveness of these two nudges, dependent on individual personality characteristics.

2.1 | Defaults

A default works by preselecting one of the options so that it is automatically taken if no active choice is made. A default is then the option that choosers obtain if they do nothing (Thaler & Sunstein, 2008). For a prominent example, consider the domain of organ donation. In some countries, citizens need to register in order to become an organ donator. In other countries, citizens are organ donator unless they specify otherwise. Importantly, in the latter countries in which organ donator is the default, the rate of organ donators is tremendously higher (Johnson & Goldstein, 2003).

Default effects are considered as a robust and well-established strategy to influence choice behavior (Jachimowicz et al., 2019), and they provide a powerful intervention for many different applied contexts like prosocial behavior, such as organ donation (Johnson & Goldstein, 2003), blood donation (Stutzer et al., 2011), and research participation (Paunov, Wänke, & Vogel, 2019a, 2019b), but also in consumer behavior, such as the compensation of CO2 emissions (Bruns, Kantorowicz-Reznichenko, Klement, Jonsson, & Rahali, 2018; Székely, Weinmann, & Vom Brocke, 2016) and consumer product choices (Brown & Krishna, 2004).

On a theoretical level, several explanations for default effects were offered over the last decades: First, defaults are expected to be chosen because switching to other options induces the aversion of losing the status quo (Dinner et al., 2011). Second, people draw inferences from a default, for example, that it is the recommended option (McKenzie, Liersch, & Finkelstein, 2006). Most importantly, however, defaults are expected to work because of the reduced effort while sticking at the default (Dinner et al., 2011; Thaler & Sunstein, 2008). The default allows for a choice without any deliberation, thus even cognitive misers can make a decision (Dinner et al., 2011). We will come back to this important point later.

2.2 | Social influence

Another popular form of nudging is to use the power of social influence (Hummel & Maedche, 2019). Social influence refers to changes in attitudes, beliefs, and behavior due to the actions or comments of other people (Cialdini & Trost, 1998; Gilovich, Keltner, & Nisbett, 2011). Thaler and Sunstein outline this principle with "following the herd" and "doing what others do" (Thaler & Sunstein, 2008). Psychologists usually distinguish between normative (conformity to be accepted and liked by others) and informational social influence (conformity because behavior or opinions of others are used as information what is right; Deutsch & Gerard, 1955). Social influence as a nudge is usually implemented by providing descriptive norms about what other people do, or injunctive norms about what is approved or accepted by others (Cialdini, Reno, & Kallgren, 1990). For example, Goldstein and colleagues (Goldstein, Cialdini, & Griskevicius, 2008) could show that towel reusing behavior of hotel guests could be increased by simply adding the information on a sign that the majority of guests in that hotel room use their towel more than once. Most importantly, many different studies have shown that social influence nudges are very effective in influencing consumer behavior, for example, to increase the willingness to pay for healthy food (Aldrovandi, Brown, & Wood, 2015), to make people buy more eco-friendly products in online grocery stores (Demarque et al., 2015), to reduce energy consumption (Allcott, 2011) or littering behavior (Cialdini et al., 1990), or to alter user behavior in business intelligence systems (Kretzer & Maedche, 2018).

In conclusion, both defaults and social influence are well-established nudges that have proven to influence consumer behavior in multiple areas. However, we believe that nudges do not have a

uniform effect on all individuals. Similar to marketing messages, of which the effect is dependent on the recipient, also the effect of defaults and social influence might be dependent on the personality of the consumer.

3 | WHICH PERSONALITY DIMENSIONS ARE RELEVANT FOR NUDGING?

In this research, we want to focus on two specific personality dimensions, the need for cognition (NFC), and the need for uniqueness (NFU). In the following, we will shortly elaborate on these constructs, how they are logically related to the nudging context—especially in the consumer area—, and what predictions can be made for their impact on default and social influence effects.

3.1 | NFC

The NFC is the tendency to engage in and enjoy effortful cognitive processing (Cacioppo, Petty, & Feng Kao, 1984). In that terms, it refers to dispositional differences in intrinsic cognitive motivation (Fleischhauer et al., 2010).

NFC is a key moderator in psychological dual-processes in persuasion (Petty, Briñol, Loersch, & McCaslin, 2009; Vogel & Wänke, 2016) and is therefore a very important construct in consumer behavior (e.g., Haugtvedt, Petty, & Cacioppo, 1992; Wood & Swait, 2002). From the perspective of such dual-process models (Petty & Cacioppo, 1986), one would expect that under low cognitive or motivational resources heuristics have more impact on information processing than when both types of resources are high. It has already been shown in many different settings that high NFC—as a generalized disposition of cognitive motivation—weakens the impact of superficial processing such as heuristics in the decision process (cf. Cacioppo, Petty, Feinstein, & Jarvis, 1996). In the same manner, also defaults and social influence can be seen as simple decision heuristics (Sunstein, 2018; Weinmann, Schneider, & vom Brocke, 2016) that should work most effectively if people have a low cognitive motivation to deliberately search and process the features of the choice options (Carnevale, Inbar, & Lerner, 2011; Smith & Levin, 1996; Verplanken, 1993). As an example, whether a position is shared by a minority or majority can serve as a simple heuristic in persuasion (Axsom, Yates, & Chaiken, 1987; Darke et al., 1998; Maheswaran & Chaiken, 1991). In a conclusion, weaker nudging effects from defaults and social influence should occur for people with a high NFC.

However, one could also argue that this influence of NFC is particularly strong for defaults, out of the following considerations: First, one core mechanism behind default effects posits that they work because people do not want to invest the cognitive effort for making an active decision (Dinner et al., 2011). In that terms, previous research categorized defaults as system 1 nudges—nudges that rely on uncontrolled and effortless thinking (Hansen & Jespersen, 2013; Jung & Mellers, 2016; Loibl, Sunstein, Rauber, & Reisch, 2018). Hence, people with a dispositional tendency to avoid cognitive effort—meaning, with low NFC—should tend more to embrace any opportunity to save the cognitive effort. Second, in contrast to social influence, a default gives people with low cognitive motivation the chance to not make a decision at all. Whereas social influence makes it necessary to at least select the choice option that is endorsed by it, defaults do not require any decision-making at all. Hence, the moderating influence of NFC should be especially strong for default effects.

3.2 | NFU

One important personality variable in context of social influence is the NFU, the "need to be different from others, to set oneself apart, and to be special" (Schumpe, Herzberg, & Erb, 2016, p. 231). According to uniqueness theory (Lynn & Snyder, 2002; Snyder & Fromkin, 1980), people aim at maintaining a balance between similarity and dissimilarity to others. The central claim of the theory is, however, that there are interindividual differences in the need to have dissimilarity, namely the NFU (Lynn & Snyder, 2002; Snyder & Fromkin, 1977). Consequentially, people with high NFU are more resistant to majority influence (Imhoff & Erb, 2009). Especially in the domain of consumer behavior, NFU is an important personality dimension: People with high NFU prefer scarce, customized, and less popular products (Lynn & Harris, 1997a; Lynn & Snyder, 2002; Ruvio, 2008; Tian, Bearden, & Hunter, 2001). Generally, individuals with high NFU seem to be more resistant towards social influence by other people. Consequently, social influence effects should also be weaker in our research for people high in NFU. Crucially, for individuals with high levels of NFU, social influence might even backfire, and lead to choices diverging from majority influences.

Interestingly, one could also speculate on an effect of NFU on default effects: Default effects work partly due to social inferences—people infer from a default that it is the recommended option (McKenzie et al., 2006) and the option most people like and choose (Everett, Caviola, Kahane, Savulescu, & Faber, 2015). However, as the empirical basis is much weaker for such a speculation, we refrain from formulating it as an explicit hypothesis.

3.3 | Summary and overview over the experiments

In a conclusion, we expect that both default and social influence effects are weaker when people have a high NFC, but that this attenuating influence of NFC is stronger for default effects. We also expect that that NFU lowers the impact of social influence.

To test these predictions, we conducted a first experiment (Experiment 1) with an online shopping scenario where product choices were directed by a default or by social influence. NFC should moderate effects especially in the former, but NFU should moderate it in the latter condition. In addition, we included a third condition in which we combined both nudges, a default and social influence. The combination of the two nudges was included because of a recent

insight on the underlying processes behind default effects. At least in some situations, defaults are perceived as the option most people choose or like (Everett et al., 2015), and could therefore reflect a process similar to social influence. However, we had separate hypotheses for default and social influence regarding NFC and NFU. This presumes that the two nudges operate by different processes and exert independent effects. Thus, if both nudges indeed operate by different processes, there should be an incremental effect of one nudge over the other. If so, both personality traits may moderate nudge effectiveness in this combined-nudge condition. Lastly, an incremental effect of one nudge over the other would not only be relevant to our hypotheses, but have important practical implications. That is default and social influence nudges can be added up to maximize compliance rates.

After the shopping task with the nudges, NFC and NFU were assessed.[1] In a second experiment (Experiment 2), we replicated Experiment 1 with a larger sample size, with another measure for NFU, and an additional manipulation to increase a participant's processing depth.

4 | EXPERIMENT 1

4.1 | Design

Our study followed a three-group experimental design, in which participants were assigned randomly to a default condition, a social influence condition, or a condition with both nudges present. In order to separate preexisting preferences and nudging effects, we used a standard counterbalancing design. Thus, in each experimental condition, half of the participants was nudged towards one option (later referred to as product set A) and the other half of participants was nudged towards the other option (later referred to as product set B). Doing so, a priori advantages for a given product of being chosen (e.g., preexisting preferences for set A over set B) would cancel each other out. Consequentially, in absence of a nudging effect, the nudged option should be picked at chance level of 50%. At the same time, choosing the nudged option in more than 50% of the cases would indicate that the nudge intervention was successful. Likewise, a backfire effect would be evident if the nudged option was chosen below chance level. Therefore, a fourth group with no nudge being displayed was not needed and allowed us to reach a higher statistical power.

4.2 | Procedure

Participants were instructed to imagine that they had invited friends for dinner, but six grocery products were still missing. An online grocery store could deliver the products still in time. Participants were instructed to project themselves into the role of this customer who would now try to buy the specific products in this online grocery store.

Before the actual shopping task and to ensure data quality, two multiple-choice questions checked whether participants had read the instructions. If one of the answers was wrong, participants were directed back to the scenario description.

In the shop, participants could navigate between the product categories via a tab menu (see Figure 1). For each category, two different products were available. The order of the product categories in the shop as well as of the products within a category were randomized for each participant.

In the default condition, one product per category was already preselected. In the social influence condition, one product per category was presented as the product with the highest customer recommendation rate of this specific category. In the combination condition, both nudges were applied on the same product. For a pure test of our nudge manipulation (vs. a preference for specific products), we counterbalanced which of the products in a category was nudged. Participants could only proceed to the basket once one product per category was selected. After clicking the button to proceed to the basket, participants were presented with a summary of the purchased products, in which they could check and potentially revise their choices. We took these final choices as dependent variables in our study.

After the shopping task, participants filled out a short awareness check and indicated their attitudes towards the products. Finally, participants were directed to the second part of the study, where they filled out personality questionnaires for NFC and NFU. After that, participants were thanked and dismissed.

4.3 | Materials and questionnaires

4.3.1 | Products

All products were displayed with a picture and a short description. The shop including all products was pretested to make sure the scenario was understandable and the products in each category were approximately equal regarding consumers' preferences. The product categories were tomatoes, bananas, bread, coffee beans, milk, and pasta.

4.3.2 | Personality assessment

We used established German versions of the NFU-g scale with 26 items (Schumpe et al., 2016), the NFC Scale with 16 items (Bless, Wänke, Bohner, Fellhauer, & Schwarz, 1994) to assess NFU and NFC. Intercorrelation, internal consistencies (Cronbach's α) and descriptive statistics can be found in Table 1.

4.4 | Sample

Our sample size was determined in an a priori power analysis for multilevel logistic regressions with a tool from Astivia, Gadermann, and Guhn (2019). More details on the calculated model can be found in the Section 4.6. From previous studies with the paradigm, we had rough approximations of some parameters (intercept variance ≈ 0.8; $b_0 \approx 0.35$). For the influence of personality, we conservatively expected a small main effect ($b = -0.25$) and pursued a power of .9

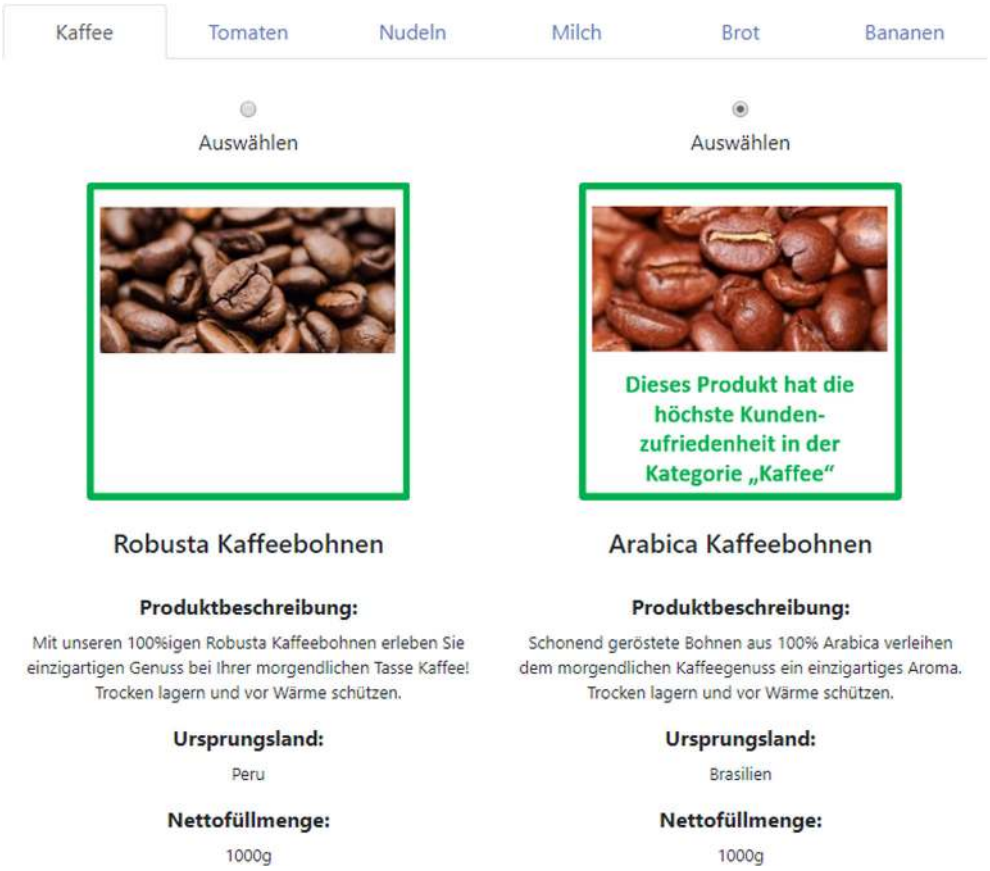

FIGURE 1 Screenshot from the online grocery store in the combination condition. In the other conditions, only the preselection or the social influence cue were applied [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 1 Intercorrelation, internal consistencies (main diagonal), and descriptive statistics of both personality variables in Experiment 1 (N = 519)

	1	2
1. Need for cognition	(.86)	.42***
2. Need for uniqueness		(.76)
M	4.5	3.26
SD	0.92	0.42

Note: For need for cognition, the scale ranged from 1 to 7; for need for uniqueness, the scale ranged from 1 to 5.
*p < .05; **p < .01; ***p < .01, two-sided testing.

for this parameter, leading to a sample size of approximately 500 participants. This sample size is also sufficient for stable estimations of personality effects (Schönbrodt & Perugini, 2013).

Thus, we recruited a total sample of N = 519 German participants via a commercial online panel. Our sample was heterogenous and representative concerning age, gender, and education. 47.6% were female, the rest male. Participants' age (M = 45.81, SD = 13.3) ranged from 18 to 69 with an approximately uniform distribution. 28.13% of our participants had lower secondary education, 31.60% had a high school diploma, 19.27% had mastered A level education and 20.0% had a university degree. Participants received 0.5 EUR (~0.56 USD) as compensation for a mean duration of ~10 min.

4.5 | Results: Nudging effects

As measurements were nested within participants and outcomes were binary, we ran a binary logistic multilevel regression model using the glmer procedure of the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2015). Our model included random intercepts for the participant to account for the dependence of observations on participants. We recoded our dependent variable such that it indicated whether the nudged option was chosen (0 = chosen non-nudged; 1 = chosen nudged). As nudges were applied on either product set A or product set B, choices of the nudged option above 50% indicate a successful nudging effect. We used a coding scheme with two dummy variables where the default condition served as a baseline, the first dummy coded the effect of the social influence condition (default = 0, social influence = 1; combination = 0), and the second dummy coded the effect of the combination (default = 0, social influence = 0, combination = 1). How many times people chose the nudged option is visualized in Figure 2.

Our analysis revealed a significant intercept, b = 0.51, SE = 0.09, z = 5.40, p <. 001, indicating that the likelihood of choosing the defaulted product was above chance in the mere-default condition. In the social influence condition, the likelihood of choosing the nudged product was slightly reduced as compared to the default condition, b = –0.19, SE = 0.13, z = –1.42, p = .155. In this condition, participants also chose the nudged product above chance level, b = 0.32, SE = 0.10, z = 3.35, p < .001. In addition, the combination group chose the

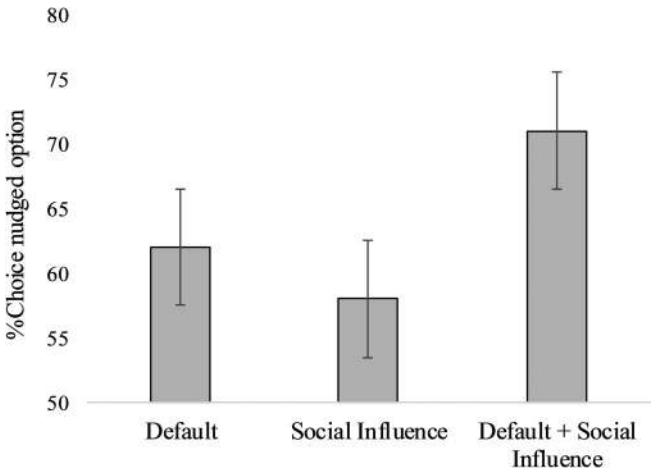

FIGURE 2 Choice of the nudged option depending on condition. Due to our counterbalancing, percentages above 50% indicate a successful nudging effect. Error bars represent 95% confidence intervals (N = 519)

nudged product significantly more often than the default condition, b = 0.37, SE = 0.14, z = 2.77, p = .006.

4.6 | Effects of personality

For testing the influence of personality, we standardized all personality variables and ran the same models including NFC and NFU. We used separate models that included one personality variable and all corresponding interaction terms. The parameter estimates can be retrieved from Table 2. Due to our coding scheme, the slopes of NFC/NFU reflect the effect in the default condition. The interactions term signal any changes of this slope in the social influence or the combination condition.

Consistent with our reasoning, NFC had a small negative impact on nudging effects in the default condition, b = −0.19, SE = 0.10, z = −1.97, p = .049. Thus, compliance was less likely if NFC was high. The two-way interactions involving NFC, however, were not significant, indicating that the effect of NFC was not significantly different in the other conditions.

However, NFU did not influence nudging effectiveness in the default condition. In lack of any significant interactions, this was not different in the social influence condition, with a simple slope of b = −0.03, SE = 0.09, z = 0.30, p = .763. In addition, we computed simple correlations between choices and personality traits within conditions, reported in the Online Supplementary.

4.7 | Interim discussion

In Experiment 1, we found a significant default and social influence effect, and even an incremental effect of both nudges in combination. In addition, we found a small effect of NFC on default effectiveness, and no influence of NFU on any nudging effects. As the effect of NFC was only slightly below the critical 5% threshold, and it is difficult to interpret null findings for NFU in a single experiment, we decided to replicate Experiment 1, addressing and improving certain limitations of the first experiment:

First, despite a satisfying internal consistency of .76 in our data, some items of the NFU scale correlated negatively with others. Exploratory analyses revealed that indeed one sub-facet of the scale was negatively or uncorrelated with the other two. Hence, null results might come from the fact that the scale did not work in the intended way. In addition, the NFU-g scale is conceptually broad, and there are other measures that have been shown to be more related to consumer behavior (Lynn & Harris, 1997b; Lynn & Snyder, 2002). In order to tackle this, we used the four item version of the Self-Attributed NFU scale (Lynn & Snyder, 2002) and translated it to German for Experiment 2.

Second, we found a small tendency for NFC to influence general nudging effectiveness in Experiment 1. In order to be certain about the presence or absence of the effect, we increased the sample size to a total amount of N = 1,042 participants for experiment 2.

Lastly, one may argue that the small observed effect of NFC was not due to differences in cognitive processing but a third unknown variable. Thus, as proof of concept, we assessed in Experiment 2 if people high in NFC indeed engaged in deeper processing. In order to have more than mere correlative evidence, we also actively manipulated processing depth in Experiment 2. From our theorizing one would expect a moderating impact not only of dispositional, but also of situational cognitive motivation. Hence, if NFC actually has an effect on nudging effectiveness, manipulating the processing depth should lead to a similar outcome, providing further support for our theoretical reasoning.

TABLE 2 Multilevel binary logistic regression models using personality variables to predict the choice of the nudged option in Experiment 1 (N = 519)

	Model NFC			Model NFU		
Source	*b*	*SE*	*p*	*b*	*SE*	*p*
Intercept	0.53	0.09	<.001	0.51	0.09	<.001
SI	−0.21	0.13	.118	−0.19	0.13	.154
CO	0.35	0.13	.009	0.37	0.14	.007
NFC	−0.19	0.10	.049			
NFC × SI	0.07	0.13	.590			
NFC × CO	0.12	0.14	.403			
NFU				−0.04	0.09	.632
NFU × SI				0.01	0.13	.910
NFU × CO				0.01	0.14	.956

Note: The positive intercept signals nudge effectiveness above chance levels in the default condition, the SI and CO dummy reveal differences in nudge effectiveness from the default condition.
Abbreviations: *b*, regression weight; CO, combination dummy; NFC, need for cognition; NFU, need for uniqueness; *SE*, standard error; SI, social influence dummy.

5 | EXPERIMENT 2

5.1 | Procedure and design

Our study followed the same procedure and design as Experiment 1, except for the following changes:

First, we varied the processing depth (deep vs. standard) between participants. In the deep condition, we provided an additional information on the scenario page, highlighted in red: Participants would have to write a short text where they would discuss their product choices. Their arguments would be rated by an expert committee and later used to improve the design of the shop. Participants in the standard condition merely received the information that they would answer some questions regarding themselves after the shop. We added an additional control question on the additional information and only forwarded participants to the shop that answered it correctly. Immediately after the shop, we asked participants of both conditions to write a short text on their product choices and why and how they made them. On the next page, we tested participant's memory on the choice options by asking six multiple choice questions, each with one correct and four distractor items.[2] After that, the procedure was identical to Experiment 1, except for substituting the NFU scale with the four-item SANU scale. Intercorrelation, internal consistencies (Cronbach's α) and descriptive statistics can be found in Table 3.

5.2 | Sample

We recruited a total sample of N = 1,042 participants via the same commercial online panel as in Experiment 1. Again, our sample was heterogenous and representative concerning age, gender, and education. 45.97% were female, the rest male. Participants' age (M = 48.81, SD = 12.99) ranged from 18 to 83 with an approximately uniform distribution. 16.12% of our participants had lower secondary education, 31.29% had a high school diploma, 22.46% had mastered A level education and 29.85% had a university degree. Participants received 0.5 EUR (~0.56 USD) as compensation for a mean duration of ~10 min.

TABLE 3 Intercorrelation, internal consistencies (main diagonal), and descriptive statistics of both personality variables in Experiment 2 (N = 1,042)

	1	2
1. Need for cognition	(.87)	.15***
2. Need for uniqueness		(.86)
M	4.58	2.41
SD	0.93	0.83

Note: For need for cognition, the scale ranged from 1 to 7; for need for uniqueness, the scale ranged from 1 to 5. The mean of need for uniqueness is lower than in Experiment 1 due to employing another scale.
*p < .05; **p < .01; ***p < .01, two-sided testing.

5.3 | Results: Processing depth

We used a multimethod approach to validate our assumptions on processing depth. We first correlated participants' NFC score with the time spent in the shop, r(1040) = .09, p = .003, the character length of their written texts, r(1040) = .16, p < .001, and the memory on the choice options, r (1040) = .17, p < .001. Next, we compared the processing depth conditions on the same three measures as a manipulation check. Participants in the deep condition, M = 181.02 s, SD = 201.15, spent significantly more time in the shop than in the standard condition, M = 147.81 s, SD = 148.61, t (914.21) = 3.01, p = .003. Both conditions also differed in the character length of their written texts, which was significantly longer in the deep condition, M = 197.03, SD = 200.99, than in the standard condition, M = 97.34, SD = 104.61, t(737.1) = 9.92, p < .001. Last, we compared both conditions regarding their memory on the choice options, which was not significantly different in the deep condition, M = 0.44, SD = 0.24, and the standard condition, M = 0.42, SD = 0.24, t(1040) = 1.44, p = .151.

5.4 | Results: Nudging effects

We used the same analysis strategy as in Experiment 1, except that we added the additional factor processing depth as a dummy-coded variable into the model. How many times people chose the nudged option, is visualized in Figure 3.

Again, our analysis revealed a significant intercept, b = 0.46, SE = 0.10, z = 4.57, p <. 001, replicating the default effect of Experiment 1 in the standard condition. In the social influence condition, the likelihood of choosing the nudged product was not different, b = 0.02, SE = 0.14, z = 0.18, p = .855. Also, the combination group chose the nudged product significantly more often than the default condition, b = 0.37, SE = 0.14, z = 2.66, p = .008. However, neither the main effect of processing depth, b = 0.04, SE = 0.14, z = 0.31, p = .755, nor

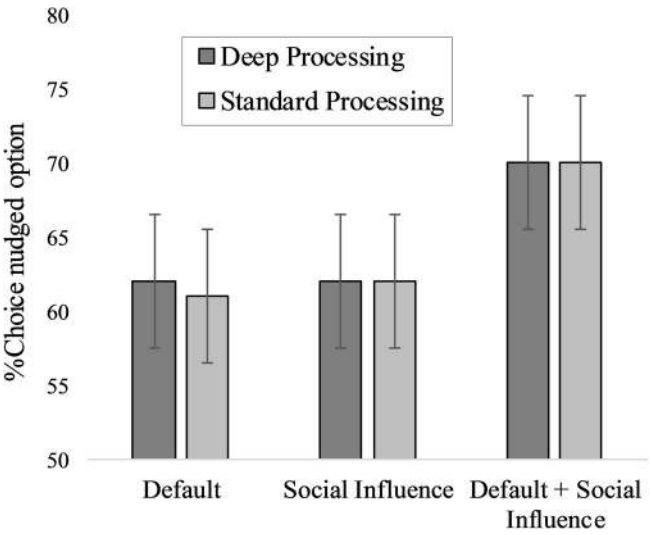

FIGURE 3 Choice of the nudged option depending on condition (Experiment 2). Error bars represent the 95% confidence interval (N = 1,042)

TABLE 4 Multilevel binary logistic regression models using personality variables to predict the choice of the nudged option in Experiment 2 (N = 1,042)

	Model NFC			Model NFU		
Source	*b*	*SE*	*p*	*b*	*SE*	*p*
Intercept	0.45	0.10	<.001	0.46	0.10	<.001
SI	0.04	0.14	.774	0.02	0.14	.868
CO	0.39	0.14	.005	0.38	0.14	.008
PD	0.07	0.14	.635	0.05	0.14	.745
PD × SI	−0.07	0.20	.710	−0.04	0.20	.840
PD × CO	−0.07	0.20	.746	−0.02	0.20	.915
NFC	−0.05	0.09	.621			
NFC × SI	−0.05	0.13	.729			
NFC × CO	−0.15	0.14	.304			
NFC × PD	0.24	0.14	.081			
NFC × PD × SI	−0.23	0.19	.236			
NFC × PD × CO	−0.19	0.20	.348			
NFU				−0.02	0.11	.815
NFU × SI				0.09	0.14	.541
NFU × CO				0.05	0.14	.754
NFU × PD				0.07	0.14	.610
NFU × PD × SI				−0.10	0.20	.621
NFU × PD × CO				−0.06	0.20	.769

Abbreviations: *b*, regression weight; CO, combination dummy; NFC, need for cognition; NFU, need for uniqueness; *SE*, standard error; SI, social influence dummy.

the interaction with the social influence dummy, b = −0.04, SE = 0.20, z = −0.21, p = .834, nor the interaction with the combination dummy, b = −0.02, SE = 0.20, z = −0.11, p = .915, were significant. Hence, processing depth did not change the effectiveness of the nudges.

5.5 | Effects of personality

For testing the influence of personality, we used the same approach as in Experiment 1, except for adding the dummy variable for processing depth and all corresponding interaction terms. The results are displayed in Table 4.

Contrary to our expectations and to the results of Experiment 1, there was no significant effect of NFC on nudging effectiveness. A marginally significant effect emerged in the default condition in which people were motivated to process the content. However, this trend pointed into the opposite direction. If anything NFC increased default compliance. Same as in Experiment 1, there was no effect of NFU in terms of main effects or interactions either (see Table 4). Simple correlations between nudge effectiveness and personality can be found in the Online Supplementary.

6 | GENERAL DISCUSSION

Despite the ongoing popularity of nudging—small modifications of choice architecture with strong effects for example, on consumer behavior—there is barely any research on the influence of personality traits on nudge effectiveness. Based on previous theorizing and research on the two popular nudges defaults and social influence, we expected that people with higher NFC show weaker social influence and default effects and people with higher NFU show weaker social influence effects. In order to test this, we ran two large-scale online experiments with a grocery shop setting that used defaults, social influence, or the combination of both. After that, we assessed participants' NFC and NFU.

Our results revealed significant default and social influence effects in both experiments, and also that the combination of both nudges leads to stronger nudging effects than each nudge individually. As such, they add to the growing body of evidence on nudges in general, and to the additive nature of defaults and information, in particular (Paunov et al., 2019a, 2019b) However, we only find a weak influence of NFC in Experiment 1 on default effectiveness that could not be replicated in Experiment 2. Hence, we conclude that if NFC has an impact on nudge effectiveness it is very small[3] and that nudges are effective even for high NFC individuals. Correspondingly, our manipulation of processing depth in Experiment 2 did not impact nudge effectiveness. In addition, in both experiments NFU had no impact on nudge effectiveness. In the following, we will first discuss the theoretical implications, and then address practical implications, but also limitations of our research.

6.1 | Theoretical implications

Despite mixed evidence, our results can also enhance our knowledge on the underlying processes behind default effects:

First, default effects have not only been explained by a reduction of effort (Dinner et al., 2011), but also by other, and potentially more cognitively demanding processes. As an example, defaults also work because people infer from a default that it is the recommended and socially approved option (McKenzie et al., 2006; Everett et al., 2015; see also Leong, Yin, & McKenzie, 2020). It is well possible that both processes—a reduction of cognitive effort and social inferences from a default—were at work in our paradigm, and while the first process was reduced by NFC, the latter one was augmented by it. As it is still difficult to disentangle the different processes within a single paradigm (Dinner et al., 2011), we can only speculate about this at this point. Overall, our results are therefore inconsistent with the common assumption that default effects are based on the reduced cognitive effort while sticking at the default (Johnson, Bellman, & Lohse, 2002), but point in a similar direction as recent findings on default effects, showing that indeed cognitive effort is not the main driving mechanism behind the phenomenon (Bruns, 2019; Jachimowicz et al., 2019). Still, the fact that we consistently find default effects on consumer choices in both experiments shows again that defaults have a major impact on our choices. This implies that future research is also necessary to gain more knowledge on the underlying processes behind default effects, and also the specific conditions when the different contributors to default effects are at work.

The previous argument suggests that default effects might not be due to heuristic processing, for which a moderating effect of NFC is expected from classical dual process models (Petty et al., 2009; Vogel & Wänke, 2016). Alternatively, the processes behind defaults may depend on the specific presentation of the default. For instance, people low in NFC could be more prone to default effects if the default is hidden rather than transparent (cf. Paunov et al., 2019a). Lastly, the problem could also lie in the power of NFC in affecting different outcomes. While findings from Experiment 2 indicate that NFC indeed goes together with higher processing depth, these effects were rather small. Those small NFC effects may therefore become evident in closely related dependent measures (e.g., thoughts about options) but might be too weak to affect more distal measures such a choice (also see Petty et al., 2009, for a discussion on heuristics in persuasion vs. heuristics in decision-making).

Regarding social influence and NFU, we based our reasoning on the theoretical foundations of uniqueness theory (Fromkin & Snyder, 1980) and previous research on interindividual differences in NFU and consumer behavior. Again, our results provide additional evidence for the impact of social influence on consumer behavior with robust effects in both experiments. However, we find no moderating effect of NFU on social influence. This result is puzzling but might fit to previous literature that shows that the effect of NFU on consumer behavior is bound to many moderators. As an example, Lynn and Snyder (2002) discuss that the inconsistent effects of NFU on the preference for scarce products depends on the measurement instrument. Other researchers argue that giving reasons for the choices beforehand is essential for NFU to influence consumer decisions (Simonson & Nowlis, 2000), but that also additional moderators like evaluation by others influence this process. Hence, we encourage other researchers to continue the investigation of social influence and NFU in the nudging context.

6.2 | Implications for practical purposes

Whereas our results do not match with our assumptions, the present work has clear-cut practical implications: First and most importantly, defaults and social influence have been shown again to influence consumer choices, and give further evidence that policy-makers, online retailers, or other choice architects can embrace nudging as easy but effective modifications of choice architecture. Second, apparently two of the most popular nudges were not majorly impacted by a consumer's NFC or NFU in our experiments. This implies that both nudges are very robust and work independent of the cognitive motivation or uniqueness seeking of the people affected by the nudge. Online retailers, as an example, do not need to consider their customers' cognitive motivation, or uniqueness seeking, when designing the choice architecture of their shops.

This reasoning also fits well with a second observation gained from our results, regarding the combined use of nudges. So far, only a few studies have examined the combined effect of two nudges (e.g., Campbell-Arvai, Arvai, & Kalof, 2014; Paunov, Wänke, & Vogel, 2020). Our results reveal that defaults and social influence worked better than each nudge individually. This could signal that despite overlapping processes in some situations (e.g., Everett et al., 2015) both nudges operate independently and thus can be combined in applied settings. However, this could also mean that the additional social influence information served as an explanation for the default and thus increased its effectiveness. Indeed, recent research shows that defaults are more effective when they are transparent, for example, if their purpose is disclosed (Paunov et al., 2020; Paunov et al., 2019a, 2019b). Hence, social influence information could also work as a transparency cue justifying the default's presence. From an applied perspective, most online stores already use recommendation systems based on electronic word of mouth. Apparently, altering choice architecture by additionally using defaults in line with legal standards can have incremental effects on their customer's behavior. Our results signal that at least these two nudges can be combined to some extent to facilitate consumer choices. However, why exactly this is the case remains uncertain, which brings us to limitations and directions for further research.

6.3 | Limitations and directions for future research

This research has some limitations that may also provide opportunities for future research. First, one point of criticism might be that participants did not make real choices. Thus, processing effort might have been low in our studies. Though participants in the deep processing condition of Experiment 2 spent more time studying the products, and also produced more arguments about the products, there was no clear effect on information recollection, nor on product choices. Likewise, NFC did not alter the nudge effects. It is therefore possible that NFC effects become only evident, if participants make consequential choices. However, research with hypothetical choices often yields the same insights as research with real choices (Johnson & Bickel, 2002; Madden et al., 2004; Wiseman & Levin, 1996). Still, differences in

effect size and effects of other moderators are possible, which needs to be examined in future studies.

Second, whereas we did not find any effect of NFU in both experiments, one should be careful to make generalizations from that. First, the NFU-g scale used in Experiment 1—despite being a published and validated scale in German—behaved unexpectedly and therefore makes the results from that study difficult to interpret. Although we tackled this problem with another scale in Experiment 2, the results were similar. However, as argued before, the theoretical mechanisms behind NFU in the nudging context might be more complex and depend on certain moderating conditions. As an example, it is possible that the scenario of the experiments limited the influence of NFU, as the products were bought for a dinner with friends and not for oneself. Previous research suggests that the resistance to majority influences is stronger for domains people use to signal their identity (e.g., music taste [Berger & Heath, 2007]). Future research should therefore examine the influence of NFU for consumer products people use to signal their identity (e.g., online stores for clothing).

Last, our results are limited to two specific nudges, and should not be generalized to general nudging effectiveness. Nudging is a broad term that subsumes lots of different interventions (Sunstein, 2016). We chose defaults and social influence for our experiments because they can be counted to the most commonly used nudges, but also because their promising theoretical foundations. However, future research should also examine other nudges and their dependence on personality traits.

6.4 | Conclusion

In the domain of consumer behavior, nudges can provide a cheap but powerful tool to influence consumer decisions. However, research on interindividual differences in nudging effectiveness is scarce. In order to change this, we examined whether two of the most popular nudges, defaults and social influence, depend on a consumer's NFC or NFU. However, our results suggest that nudging effects are mostly robust against any impact of both personality constructs. Hence, we encourage practitioners to make use of these nudges to boost consumer decisions, and researchers to use our studies as a first start to also contribute to the field of interindividual differences in nudging.

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DECLARATION OF INTEREST

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ENDNOTES

[1] As an exploratory research question, we also examined if the Big Five personality traits moderate the effectiveness of the nudges. In experiment 1, we therefore assessed the short form of the BFI (Rammstedt & John, 2007). Unfortunately, the reliabilities were very poor. We therefore refrain from a detailed consideration of these constructs in the remainder of this article. Results for the Big Five are reported in the Online Supplementary.

[2] For the first $N = 234$ participants, we also assessed participant's memory on the product names. Unfortunately, the answers could not be directly related to the specific products because of a programming error.

[3] We also performed a conservative sensitivity analysis using G-Power (Faul et al., 2007), with the logistic regression interface as approximation. Assuming a power of .8, our sample size of Experiment 2 would have been sufficient to detect an effect of NFC in our model of $d > .08$ (based on the tables provided by Chen, Cohen, & Chen, 2010).

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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