The One that I Want: Strong personal preferences render the center-stage nudge redundant

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A R T I C L E   I N F O

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A B S T R A C T

In recent years there has been increased attention for nudging as a tool to alter consumer decisions. While nudges should in theory preserve freedom of choice by respecting consumers' preferences, empirical scrutiny of this claim is sparse. This research investigates the effectiveness of a center-stage nudge to encourage the consumption of a small portion size of soda. Specifically, in all studies we measure the extent to which strong preferences that are incongruent with the aim of the nudge (i.e. thirst and liking) and nudge congruent preferences (i.e. intentions to reduce soda consumption (study 1); Healthy diet goals (observed in study 2; manipulated in study 3)) could be expressed when a choice is nudged. In three studies (n = 119; n = 184; n = 202) it was found that strong preferences are not trumped by the nudge and in fact overrule the effectiveness of a center-stage nudge. These findings contribute to the debate about the ethical considerations that are voiced concerning nudge interventions, and urge choice architects to consider consumers' prior preferences as an important boundary condition of effective nudge interventions.

1. Introduction

In the past decade, nudges – defined as changes in the choice architecture that facilitate desired choices without forbidding alternative options (Thaler & Sunstein, 2008) – have been frequently employed as a tool for facilitating behavior change in a wide variety of public policy domains, ranging from sustainability to public health (e.g., Benartzi et al., 2017; Dolan et al., 2012; Johnson & Goldstein, 2003; Liebig & Rommel, 2014). Whereas nudges have been the subject of many scientific investigations (Szaszi, Palinkas, Pafi, Szollosi, & Aczel, 2018), few studies have addressed specific mediators or moderators of nudge effectiveness (Arno & Thomas, 2016; Marchiori, Adriaan, & De Ridder, 2017). This lack of insight into when and how nudges result in desired behavior precludes an understanding of the boundary conditions of nudge effectiveness, which may eventually result in missed opportunities to enhance the impact of nudge interventions. In a series of three studies, we examine one specific boundary condition that is crucial for the understanding of how nudges operate and when they are (or are not) effective: the extent to which nudges align with personal preferences of the nudgee. We do so by investigating how existing preferences impact the effect of a center-stage nudge (i.e., a nudge that exploits people's tendency to select the middle option in an array) that encourages choices for smaller portions of soft drinks.

The reduction of soft drink consumption has been identified as an important public health target because a high intake of soft drinks is considered a serious risk factor in the development of overweight (Malik, Schulze, & Hu, 2006). Previous attempts to address this issue, such as pricing strategies and banning large portion sizes, have met with strong opposition from both industry and consumers themselves (Crino, Sacks, & Wu, 2016). An alternative approach lies in facilitating the choice for reduced portion sizes of soft drinks (Popkin et al., 2006; Vermeer, Steenhuis, & Poelman, 2014). A nudge that employs the presentation of different portion sizes to encourage a choice for smaller portions of soft drinks is a promising avenue for reduced consumption, as most convenience stores offer multiple size options of the same product (Bucher et al., 2016; Pham, 2014). Usually, different options are presented ascending from small to large as viewed from the perspective of the customer. Our objective is to test whether rearranging the display of portion sizes – with the smaller healthier option in the middle instead of on the left – will lead to an increase in the selection of the smaller portion size, as is suggested by research on the center-stage effect. Importantly, we will test whether the effectiveness of this nudge depends on whether people have nudge congruent preferences (i.e., a goal to consume fewer calories) or nudge incongruent preferences (i.e., liking of soft drinks or the visceral drive of thirst).

Research on the center-stage effect has revealed that, insofar all
options can be considered simultaneously in a horizontal array, people have a tendency to select the option that is placed in the middle (Atalay, Bodur, & Rasolofoarison, 2012; Valenzuela & Raghubir, 2009). This effect has been demonstrated for a wide range of consumer choices, such as products (e.g. pens, chewing gum) and services (e.g., toilet cubicles) (Christenfeld, 1995; Shaw, Bergen, Brown, & Gallagher, 2000). The documented tendency to choose the middle option can be implemented as a center-stage nudge by placing the sensible choice in the middle, as has been shown in a recent study indicating that the display of a low-calorie granola bar in the middle of other high-calorie options leads to a more frequent selection of this bar compared to when it was placed on the left (Keller, Markert, & Bucher, 2015). Whereas this study has provided initial evidence for the potential of the center-stage nudge in promoting healthy choices, we argue that the effect might depend on whether or not people have a strong preference to select a healthy choice. This notion is important in view of understanding the boundary conditions of nudge effectiveness, as neglecting to account for the impact of preferences can lead to an biased estimation of the nudge effect (e.g., Arno & Thomas, 2016). The effect of nudges might be underestimated because of individuals whose personal preferences do not align with the aim of the nudge and might be overestimated because people already hold a strong preference for healthy consumption. The current series of studies is the first to empirically investigate the role of preferences in nudge effectiveness.

Both from a psychological and an ethical point of view, a good match between a persons' preferences and the targeted behavior of the nudge is mandatory. From a psychological perspective, nudges are an important device that may to help to bridge the so called ‘intention – behavior gap’ between what people want to do and what they actually do (Sheeran, 2002). Nudges may support people acting upon their goals which they might otherwise forget or ignore in the heat of the moment. At the same time, nudges should not completely overrule strong desires for alternative options, as otherwise they would violate the essential requirement of the nudging concept that they facilitate autonomous decision making without any infringements upon peoples’ freedom of choice (e.g., Vugts, Van den Hoven, De Vet, & Verweij, 2018).

The general idea behind nudging is that people are encouraged to make a choice that is line with their own best interests, but should be able to choose differently without much effort or cost when they have another choice in mind. To the best of our knowledge, there is only one empirical study addressing this issue explicitly, demonstrating that a default nudge that automatically transferred people’s tax refunds into a savings account proved ineffective when people had already made other plans to spend their refunds (Bronchetti, Dee, Huffman, & Magenheim, 2013). Whilst this initial finding that nudge incongruent preferences (i.e. wanting to spend the money on something other than saving) render the nudge ineffective calls for more empirical support, it is also unclear what will happen when people already hold strong preferences that do align with the nudge. Is the nudge then still effective or is it redundant because people do not need the nudge to act upon their preferences? Recent research suggests the latter. In a study examining the effect of a default nudge to promote green energy, the nudge was a good predictor of the choice for green energy for participants with weak and medium environmental attitude strength, but lead to a relatively lower increase in choices for a green energy provider when participants had very strong environmental attitudes (Vetter & Kutzner, 2016). Based on this preliminary finding, we expect that a nudge will be redundant for people with strong nudge congruent preferences. Moreover, we expect that strong nudge-incongruent preferences will also render the nudge ineffective.

1.1. Overview of current studies

The present series of three studies will examine the role of personal preferences on the effectiveness of a center-stage nudge for choosing smaller portion sizes of soft drinks. In all studies, participants were invited to choose from three different cup sizes, small (200 ml), medium (300 ml) or large (400 ml), filled with either Coke (42 kcal per 100 ml) or Orange soda (33 kcal per 100 ml) to accommodate personal taste preferences. In the experimental nudge condition, the desired healthier choice – the smallest cup with the lowest number of calories – was placed in the middle of the array to accomplish a center-stage nudge. In the control condition, the smallest cup was placed on the left side of the choice arrangement, as is normally the case when exposing options varying in size (small to large from left to right; Dickinson & Intraub, 2009). In the first study we assessed the effect of the center-stage nudge while accounting for participants’ susceptibility to the influence of a nudge by manipulating state self-control. In doing so, we aim to create optimal conditions for testing nudge effectiveness as it has been suggested that low self-control may promote responsiveness to nudges (Cheung, Kroese, Fennis, & De Ridder, 2017; Hunter, Hollands, Couturier, & Marteau, 2017; Salmon, Fennis, de Ridder, Adriaanse, & De Vet, 2014). In Study 1 nudge congruent preferences were operationalized as the specific intention to reduce soft drink consumption. In the second study we aimed to replicate the findings from study 1 with an alternative operationalization of the nudge congruent preference; instead of concrete intentions to reduce soda consumption we inquired to what extent participants strove to adhere to a healthy consumption pattern. Study 3 presents a more stringent test of the role of these preferences in center-stage effectiveness by manipulating the perceived importance of adhering to a healthy diet goal. Liking of a particular food product has been shown to be a good predictor of portion size selection (Brunstrom & Shakeshaft, 2008). Therefore, in all three studies nudge incongruent preferences were operationalized as liking of the chosen soda and thirst. It was hypothesized that the effect of the center-stage nudge would be overruled by personal preferences, such that people with strong nudge-incongruent preferences would opt for larger cup sizes while people with strong nudge-congruent preferences would opt for smaller cup sizes regardless of the presence of a nudge.

2. Study 1

In this study we examined the center-stage effect on cup size selection, while accounting for the mindset that participants are in. It has been suggested that people are more prone to be influenced by nudges, when they experience low self-control (i.e. are tired, distracted or otherwise temporarily less capable or willing of making calculated decisions) (e.g., Hunter et al., 2018; Salmon et al., 2014).

2.1. Method

2.1.1. Participants

One hundred and nineteen participants (67.2% female) were recruited on university campus via posters and flyers. One female participant was excluded because she was not allowed to drink any carbonated drinks. The mean age was 21.91 years (SD = 3.90).

2.1.2. Design and procedure

The experiment had a 2 State Self-control (high vs. low) by 2 Nudge condition¹ (nudge vs. control) between subjects factorial design. Upon arrival in the lab, participants signed the informed consent form for a study advertised as “The influence of glucose on recovery after a cognitively strenuous task”. They commenced by filling out a paper questionnaire about their current state of mind, intended to assess levels of thirst. They then proceeded with an E-crossing task (Baumeister,
with the aim of manipulating the level of state self-control, see Section 2.1.3.2. This task was presented to participants as the cognitively strenuous task. After completing this task, participants indicated their preferred soda (Orange soda or Coke) and their preferred cup size. The experimenter provided them with the soda in the cup size of their choice and a magazine while explaining that they had a five minute break for consumption of the soft drink. After five minutes the experimenter re-entered their cubicle with the “recovery questionnaire”, which was used as a manipulation check for state self-control and an assessment of participants’ intentions to reduce their soft drink consumption. Subsequently participants were probed for the conjecture of the study. Finally, participants were thanked and compensated for their participation (course credit or €4), and were told that a debriefing was available upon request by sending an email to the researcher.

2.1.3. Materials

2.1.3.1. State of mind questionnaire. Participants were required to indicate on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much) to what extent they felt thirsty. To assess this unobtrusively, this item was hidden between items that assessed how hungry, cheerful, tired, bored, concentrated, self-confident, energetic, anxious or sad they felt.

2.1.3.2. E-cross task. To manipulate state self-control, an e-cross task was administered. In both conditions participants were first told to cross all “e”s in a practice text. In the second part, participants in the high state self-control condition were told to continue as previously instructed, whereas participants in the low state self-control condition were told to only cross the “e” when the word did not contain any other vowels or was two or more spaces removed from a vowel. This task has been successfully used in previous studies to manipulate state self-control (e.g., Wan & Sternthal, 2008; Baumeister et al., 1998).

2.1.3.3. Center-stage nudge. The three cup sizes were presented as images of plastic cups varying in size and the content in milliliters was written below the images, respectively 200 ml, 300 ml and 400 ml. The cups in the control condition were presented in ascending order size, small, medium, large, and in the nudge condition the smallest option was presented in the middle (see Fig. 1).

2.1.3.4. Recovery questionnaire. The recovery questionnaire presented participants with three questions that served as a manipulation check: “I feel exhausted”, “I thought that the second part of the task was more difficult” and “I thought the task was taxing”, that were answered on a 5-point Likert scale, ranging from 1 (totally disagree) to 5 (totally agree). As Cronbach’s alpha (0.470) was below standards, we will use single items instead of a scale.

In addition, this questionnaire was used to assess participants’ intention to reduce their soft drink intake, answered on a scale ranging from 1 (do not like at all) to 6 (like it very much). Liking of soft drinks was combined with thirst in a composite measure (i.e., the mean of both standardized values, cf. Duckworth & Seligman, 2006) of nudge-incongruent preferences. These items were hidden in other questions that were in line with the cover story but irrelevant for the purpose of the study (e.g., motivation to do well on the task).

2.2. Results

2.2.1. Randomization check

Separate ANOVAs with Nudge condition and State Self-Control condition as independent variables showed no main or interaction effects on intention to reduce soft drink consumption, thirst, or liking of soft drinks, p’s > .156. Nor did gender differ across conditions, $\chi^2(3) = 1.26, p = .738$, indicating successful randomization.

2.2.2. Manipulation check

To assess whether the state self-control manipulation was successful, a MANOVA was performed with the three manipulation check items (i.e., exhaustion, difficulty of the task, the extent to which the task was taxing) as dependent variables and state self-control condition as a predictor. The analysis revealed a significant difference between conditions, where -as anticipated- participants in the low state self-control condition scored higher than participants in the high state self-control condition, $F(3, 113) = 30.79, p < .001$. Thus, we may conclude that the manipulation of state self-control was successful.

2.2.3. Main analysis

Frequencies of selected cup sizes in each condition are reported in Table 1. To test the effectiveness of the nudge, a binary logistic regression was performed, with cup size choice as dependent variable coded into healthy (small size) and unhealthy (medium or large size) choice. In the first step, only Nudge Condition was entered as a predictor, to establish a baseline effect of the center-stage nudge. In the second step State Self-Control Condition, nudge-congruent preferences, nudge-incongruent preferences, and gender were added. Finally, Step 3 included an interaction term between Nudge Condition and State Self-Control Condition. The first step showed that, overall, the nudge significantly affected the likelihood of choosing the smallest drink: participants in the nudge condition were 2.35 times more likely to select the healthy choice compared to participants in the control condition, $b = 0.85$, Wald $\chi^2(1) = 5.17, p = .023$. Adding the other predictors in

### Table 1

| State self-control | 200 ml | 300 ml | 400 ml |
|-------------------|--------|--------|--------|
| Control condition |
| Low               | 11 (36.7%) | 13 (43.3%) | 6 (20.0%) |
| High              | 12 (40.0%) | 11 (36.7%) | 7 (23.3%) |
| Total             | 23 | 24 | 13 |
| Nudge condition   |
| Low               | 20 (66.7%) | 8 (26.7%) | 2 (6.7%) |
| High              | 15 (51.7%) | 13 (44.8%) | 1 (3.4%) |
| Total             | 35 | 21 | 3 |

Fig. 1. Presentation of the cups in the control condition (top row) and the nudge condition (bottom row).

Bratslavsky, Muraven, & Tice, 1998)}
Table 2
Logistic regression model to predict healthy soft drink portion size Study 1.

|                      | b     | Wald (df) | p   | OR   |
|----------------------|-------|-----------|-----|------|
| Constant             | 2.75  | 10.52 (1) | .001| 0.06 |
| Nudge Condition      | 0.95  | 5.33 (1)  | .021| 2.57 |
| Self-Control Condition| 0.19  | 0.21 (1)  | .647| 1.20 |
| Congruent preferences | -0.63 | 4.22 (1)  | .040| 0.54 |
| Incongruent preferences| 0.26  | 2.65 (1)  | .104| 1.30 |
| Gender               | 1.26  | 10.52 (1) | .005| 3.54 |

Note. The dependent variable was coded as 1 = unhealthy; 2 = healthy. Control Condition, Low Self-Control Condition, and Male were used as reference groups for Nudge Condition, Self-Control Condition and Gender, respectively. Nagelkerke $R^2$ = 0.225.

Step 2 revealed that, while the effect of the nudge remained significant ($p = .021$), cup size choice was also determined by nudge-incongruent preferences (i.e., liking and thirst; $p = .040$) and gender ($p = .005$), showing that thirsty and male participants were less likely to select the small cup size. We found no significant effect of nudge-congruent preferences (i.e., intention to reduce soft drink consumption, $p = .104$). Adding the interaction term between Nudge Condition and State Self-Control Condition in Step 3 did not yield a significant improvement of the model; the interaction was not significant ($p = .263$). Table 2 reports the analysis results for Step 2.

2.3. Discussion

The results of Study 1 suggest that the center-stage nudge was effective in encouraging the healthy soft drink size but did not overrule nudge-incongruent preferences, which remained a significant predictor of the choice. That is, if people were more thirsty or liked soda a lot they were more likely to select larger soft drink cups, regardless of the presence of the nudge. Contrary to our expectations, the intention to reduce soft drink intake did not have a significant effect on cup size selection. The absence of this effect might be due to our assessment of intentions. Apart from measuring it directly after the behavior, which might have biased the answer (e.g., Festinger, 1962), the intention to reduce soft drinks can be considered quite specific. Moreover, intentions are generally found to be poor predictors of actual behavior (Sheeran, 2002) and may be waxing and waning over time (Conroy, Elavsky, Hyde, & Doerksen, 2011). In Study 2 we will therefore examine the role of healthy diet goals and apply a priming procedure to make sure that participants’ healthy diet goals would indeed be currently active. State self-control did not affect the choice in study 1; these findings are in line with the work by Missbach and König (2016), who (using a different manipulation) also found no effect of state self-control on the effectiveness of a center-stage nudge. Therefore we will not further examine the role of self-control in nudge effectiveness.

3. Study 2

In Study 2 the effectiveness of a center-stage nudge on the choice for smaller cup sizes of soft drinks was examined while considering healthy diet goals as a measure of nudge congruent preferences. It was expected that a strong health goal would result in a preference for the smallest portion size, regardless of the presence of a nudge. Considering that such more superordinate goals may sometimes linger in the back of people’s minds we subtly reminded them by priming this goal, thereby increasing their so-called mental accessibility (e.g., Janisiewski & Wyer, 2014) which is known to be an important predictor when it comes to actual behavioral choices (e.g., Dik & Aarts, 2007). As an additional benefit, this task served the purpose of the alleged cognitively strenuous task that was part of the cover story.

3.1. Method

3.1.1. Participants

One hundred and eighty-four students were recruited in the university buildings via posters and flyers. When they agreed to participate, participants were required to send an email to the researcher in order to receive a participant number and a link for the first online part of the study (N = 178). Participants were only included in the analyses if they also completed the second part of the study in the lab, resulting in a final sample of n = 153 (67.3% female) with a mean age of 21.56 years ($SD = 3.08$) and an average Body Mass Index (BMI) of 21.98 ($SD = 3.92$). Participants who completed both parts of the study did not differ significantly on health goal strength, age or gender from the 25 participants who did not complete the second part, $p’s > .108$.

3.1.2. Design

The experiment had a factorial design with Condition (nudge vs. control) as a between subjects factor. Participants were randomly assigned to one of the conditions when the experimenter received their participation email, resulting in 72 participants in the nudge condition and 81 participants in the control condition.

3.1.3. Procedure

Participants first filled out an online questionnaire assessing their healthy diet goals, after which they were invited to come to the lab. Upon arrival, participants signed an informed consent form for a study presented as examining ‘recovery after a cognitively strenuous task’. They commenced by filling out a paper questionnaire about their current state of mind, intended to assess thirst. Next, they performed a lexical decision task to prime the mental accessibility of their health goal. This task was framed as the cognitively strenuous task. Consecutively, they indicated their preference for Orange soda or Coke, and their preferred cup size (small, medium or large). The researcher then entered to collect the questionnaire and returned with the soft drink in the cup size of their choice. Subsequently, to corroborate the cover story participants were invited to enjoy their soft drink while watching an eight-minute film clip, to create a naturalistic consumption setting (Vereecken, Todd, Roberts, Mulvihill, & Maes, 2006) and were asked to fill out a second questionnaire that assessed demographics. After completion, they were probed for their understanding of the aim of the study. All participants reported the cover story as the aim of the study. Finally, participants were thanked and compensated for their participation (course credit or €4), and were told that debriefing was available upon request.

3.1.4. Materials

3.1.4.1. Online questionnaire. During the first part of the study, an adjusted version of the Personal Striving questionnaire (Emmons, 1991) was administered to assess to what extent participants strived to adhere to a healthy diet goals. This was done with the items (“I try to eat healthily every day”; “I try to avoid eating unhealthily every day”). Participants were explained that personal strivings refer to ongoing goals that they try to achieve through their behavior. Personal strivings have been used and validated in many studies as an operational account of motivations and goals (for example, King, 1995; Simons, Christopher, & Mclaury, 2004). To avoid suspicion, participants’ strivings in six other domains were also assessed, such as finance (e.g., “I try to avoid spending too much”) and appearance (e.g., “I try to look good every day”). In total, participants indicated for eight strivings how much they applied to them on a 0 (not at all) to 100 (totally) visual analogue scale. A higher score indicates that the striving is more applicable to that person, and hence stronger. Both health strivings were significantly correlated, $r = 0.59, p < .001$. The variable General Health Goal was computed as the mean score of these two strivings and reflected participants’ nudge-congruent preferences.
3.1.4.2. State of mind questionnaire. Thirst was assessed the same as in Study 1.

3.1.4.3. Center-stage nudge. This was the same as in Study 1.

3.1.4.4. Lexical decision task. To prime the mental accessibility of the health goal a lexical decision task was conducted. The lexical decision task was programmed in Inquisit® software in a frame from Lepore and Brown (2002). Participants were instructed to press the “Z” key on the keyboard when they saw a non-word and to press the “M” key when they saw a word. Participants had four practice trials with two neutral words and two nonwords. After the practice rounds and a repetition of the instructions 52 trials with 26 nonwords, 21 neutral words and 5 critical words were presented to the participant in random order. A fixation cross was shown for two seconds before a (non-) word appeared. Then the word or non-word appeared for one and a half seconds. The critical words were the (masked language) translations of “Healthy”, “Vital”, “Slim” “Health-conscious” and “Fit”. The neutral words were related to the categories banking, driving and tools. Reaction times were not analyzed since the task was not included as words were related to the categories banking, driving and tools.

3.2.1. Randomization check

3.2. Results

3.2.1. Randomization check

Separate ANOVAs were performed to examine whether participants across both conditions differed in age, BMI, thirst, general health goal, liking, and consumption frequency of the chosen soft drink was assessed on a 6-point Likert scale, ranging from 1 (do not like at all/never) to 6 (like it very much/everyday). Again, liking and thirst (assessed at baseline) were combined in a measure of nudge-incongruent preferences.

3.2.2. Main analysis

Table 3 presents an overview of the choices for different cup sizes in each condition, showing that in both the control condition and the nudge condition the majority of participants opted for the smallest cup. A similar logistic regression analysis (see Table 4) as in study 1 was performed, with cup size choice as the dependent variable coded into healthy (small cup) or unhealthy (medium or large cup) choice. The first step showed no significant effect of the nudge (p = .331). In Step 2, strong effects of nudge-incongruent preferences (b = 1.51, Wald $\chi^2(1) = 14.15$, Exp(B) = 0.22, $p < .001$) and nudge-congruent preferences (b = 1.03, Wald $\chi^2(1) = 18.76$, Exp(B) = 2.81, $p < .001$) were found. Step 3 showed that female participants were two and half times more likely than male participants to select the healthy portion size, $b = 0.95$, Wald $\chi^2(1) = 4.10$, Exp(B) = 2.60 $p = .043$.

3.3. Discussion

The second study showed that participants overall chose the healthier, smaller, cup size more often regardless of the presentation order of the cups. Our findings lend support to the idea that this may be due to a pre-existing preference for a smaller cup based on health considerations, as participants with stronger healthy diet goals more often opted for the small cup irrespective of being exposed to the center-stage nudge or the regular display of cup sizes. By the same token, participants with strong nudge-incongruent preferences (i.e., those who were thirsty and liked soft drinks a lot) were less likely to choose a smaller cup regardless of the presence of a nudge, thus also revealing a strong effect of preferences albeit in the opposite direction. Thus, we conclude that participants still acted in line with their preferences and that, in this regard, their freedom of choice indeed remained intact. That being said, it should be noted that we could not yet establish that the center-stage nudge would help to guide decisions of people who do have a health goal that is not currently on the top of their minds. This is a relevant piece of information since this is where the nudge should have its largest potential. Study 3 was designed to test the idea that a nudge would not be effective (i.e., redundant) among participants with an active health goal, but would be effective among participants with a less active health goal.

4. Study 3

The aim of Study 3 was to replicate the findings of Study 2 with a more direct test of the potential auxiliary effect of the nudge with regard to the enactment of personal preferences by manipulating the saliency of people’s healthy diet goals. It was expected that, similar to the previous studies, participants’ healthy diet goals (i.e., nudge-congruent preferences) would influence their behavior regardless of the presence of a nudge, but only when these were focal (i.e., on the top of their minds) when people chose their cup size. In contrast, when healthy diet goals are less focal we expected that the nudge would have a beneficial effect such that it would help people select smaller cup sizes compared to when no nudge was present. Improving on a practical matter of the first two studies, participants in Study 3 were asked to go and get their cup of soft drink themselves, making sure they had an accurate idea of what each cup size looked like (rather than indicating their choice on paper before actually seeing the different sizes). This study was pre-registered at as.predicted.org [http://aspredicted.org/j5Hl3.pdf].

4.1. Method

4.1.1. Participants

Participants were recruited in the university buildings via posters and flyers for a study that allegedly measured the effect of caffeinated soda on cognitive performance. Two hundred and two participants (71.8% female) took part in this study. The mean age was 22.93

| Condition          | B     | Wald (df) | p    | OR   | 95% CI OR |
|--------------------|-------|-----------|------|------|-----------|
| Constant           | 0.10  | 0.05 (1)  | .816 | 1.11 |           |
| Condition          | 0.43  | 0.95 (1)  | .331 | 1.54 | [0.65, 3.65] |
| Incongruent preferences | -1.51 | 14.45 (1) | <.001 | 0.22 | [0.01, 0.49] |
| Congruent preferences | 1.03  | 18.76 (1) | <.001 | 2.81 | [1.76, 4.48] |
| Gender             | 0.95  | 4.10 (1)  | .043 | 2.60 | [1.03, 6.53] |

Note. The dependent variable was coded as 1 = unhealthy; 2 = healthy. Condition was coded with control condition as a reference group. Gender was coded with male as reference group. Nagelkerke $R^2 = 0.405$.

Table 3

| Portion Size | Control | Nudge |
|--------------|---------|-------|
| 200 ml       | 48 (66.7%) | 54 (66.7%) |
| 300 ml       | 17 (23.3%) | 20 (24.7%) |
| 400 ml       | 7 (9.7%) | 7 (8.6%) |

Table 4

Logistic regression model soft drink portion size Study 2.
(SD = 4.81) and participants had an average BMI of 22.51 (SD = 2.89).

4.1.2. Design

This study had a 2 Nudge condition (nudge vs. control) by 2 Focal Health Goal (yes vs. no) factorial between subjects design. Participants were randomly assigned to one of the four conditions when they signed up for the study, resulting in 50 participants in the Nudge/Focal Goal condition, 51 in the Nudge/Non-Focal goal condition, 49 in the Control/Focal Goal condition, and 52 in the Control/Non-Focal Goal condition.

4.1.3. Procedure

Upon arriving in the lab all participants were told that they were allocated to the non-caffeine condition. Participants were seated in a cubicle and filled out demographics, the state of mind questionnaire and the focal goal manipulation. Then they were lead to a separate room where they were asked to pick a glass of Orange soda and bring it back to their cubicle. Once seated they completed two cognitive tasks while drinking the soda. Upon completion participants were asked how frequently they drink Orange soda, how much they like Orange soda and how important they find it to eat healthily. Finally, participants were thanked and compensated (€4 or course credit) and told that they could receive a debriefing by sending an email to the experimenter.

4.1.4. Materials

The same state of mind questionnaire was used as in Study 1 and Study 2 to unobtrusively measure participants’ thirst. Frequency of Orange soda consumption was inquired on a scale ranging from 0 (every day) to 6 (never). Liking of Orange soda was asked on a 6 point Likert scale ranging from 1 (not at all tasty) to 6 (very tasty). The importance of a healthy diet was assessed after the cognitive tasks on a scale from 1 (not at all important) to 6 (very important). Similar to Study 1 and 2, a composite score of liking and thirst was created as a measure of nudge-incongruent preferences.

4.1.4.1. Focal goal manipulation. We aimed to influence participants’ focal goal by manipulating the importance of the health goal relative to other goals. Participants were asked to rank five goals from 1 (most important) to 5 (least important). In the Focal Health goal condition the goal of “eating healthy” was contrasted against trivial goals, such as keeping one’s house clean or going to the hairdresser regularly. In the Non-Focal goal condition, it was contrasted against substantial goals, such as finding love or gaining new life experiences (Wedell, Hicklin, & Smarandescu, 2007). Healthy eating was presented as the fourth goal in both conditions. A pilot study (N = 145) validated that the focal goal manipulation.

4.2. Results

4.2.1. Randomization check

Separate ANOVA’s were performed with age, BMI, thirst, liking, and consumption frequency of Orange soda as dependent variables and condition as the predictor variable. There were no differences between the four conditions, p’s > .125. The four conditions also did not differ significantly on gender, p = .680, indicating a successful randomization.

4.2.2. Manipulation check Focal goal

A Mann-Whitney test was performed to examine whether the manipulation of the relative importance (‘focality’) of the health goal was successful. As expected, participants in the focal goal condition ranked the health goal as significantly more important (M_{rank} = 53.90) than participants in the non-focal goal condition, M_{rank} = 147.25, U = 9.81, z = 11.89, p < .001, r = 0.84.

4.2.3. Main analysis

Table 5 presents an overview of the cup size choices per condition and reveals that the smallest cup size was chosen most often, regardless of the presence of a nudge or activation of the health goal. To examine this pattern in more detail, a stepwise binary logistic regression was performed, with cup size choice as the dependent variable, coded into healthy (small cup) and unhealthy (medium and large cup) choice. In the first step Nudge condition was added as a predictor, followed by Focal goal condition and the interaction between Nudge and Focal Goal in Step 2. Neither step yielded a significant model (p’s > .625). In Step 3 of the analysis, nudge-congruent and nudge-incongruent preferences were added, together with Gender. Step 3 revealed significant effects of nudge-congruent and nudge-incongruent preferences as well as gender.

Table 6 provides an overview of the complete model. There was no main effect of the Nudge condition; solely repositioning the cups did not influence the choice for a healthy or unhealthy portion size, p = .796. Nor was there a significant main effect of the Focal goal condition, p = .982. Unexpectedly, the interaction effect between Nudge condition and Focal Goal condition was not significant either, p = .825. However, consistent with Study 1 and 2, personal preferences predicted cup choice: stronger nudge-incongruent preferences increased the likelihood of selecting an unhealthy portion size (b = −1.27, Wald χ²(1) = 25.00, Exp(B) = 0.28, p < .001); stronger nudge-congruent preferences significantly increased the likelihood of selecting the healthy option, b = 0.41, Wald χ²(1) = 5.72, Exp(B) = 1.51, p = .017. Lastly, Gender was a significant predictor (b = 0.89, Wald χ²(1) = 6.07, Exp(B) = 2.44, p = .014), men were more likely to select larger portion sizes.

5. General discussion

The current investigation focused on how existing preferences interfere with the effectiveness of a center-stage nudge. We proposed that nudges would be redundant when people already have strong preferences that are congruent with the nudge. Conversely, when people have nudge incongruent preferences they should not be influenced by the nudge, since that would violate their autonomy. Three studies showed that participants’ nudge-congruent and nudge-incongruent preferences indeed consistently predicted their cup size choices.
regardless of the presence of a nudge that aimed to promote the choice for the smallest cup. Specifically, participants who valued a healthy diet (i.e., nudge-congruent preference) tended to choose the smallest cup size, and the presence of a nudge did not further enhance this tendency; the nudge was redundant. Whereas participants who liked soft drinks a lot and/or were very thirsty (i.e., nudge-incongruent preferences) tended to choose larger cup sizes, and the presence of a nudge did not reduce this tendency; the nudge did not interfere with their personal preferences.

Unexpectedly, we did not find that the effectiveness of the nudge was moderated by the focality of people’s healthy diet goals, as tested in Study 3. That is, we predicted that the nudge would be redundant when people had focal healthy diet goals, but would effectively influence people’s choices when their healthy diet goals were temporarily less focal. In hindsight, however, the used manipulation of goal focality may not have been the most appropriate, since focality of the goal might not be only reason why people sometimes fail to act in line with their goals (Sheeran, 2002). Even though the manipulation was successful in bringing a healthy diet goal to mind, the urge to quench thirst might be stronger. Future research should look at the potential of nudges to resolve these conflicting preferences.

The finding that people’s personal preferences guide their behavior even in the presence of a nudge is important in light of ethical discussions about nudging. Nudge critics have expressed concerns that nudges would be manipulative in the sense that they would steer people’s behavior in directions they would not want (e.g., Schubert, 2017). Such concerns are of course legitimate and cannot be waived by the mere statement that nudges are not intended to interfere with people’s preferences. Instead, empirical testing of such claims is essential to gain further insight into whether, when and how nudges affect behavior. The current studies add to a growing body of empirical literature on the boundary conditions of nudge effectiveness that in turn could fuel ethical debates.

Besides relating to ethical concerns, the role of preferences in nudge effectiveness also has relevant implications for policy makers. Our research suggests not only that nudges will not steer behavior in a direction that goes against people’s preferences, it also implies that nudges will be redundant when people already have strong preferences that are in line with the nudge behavior. This is important to consider when deciding which behavior to nudge, at what location and for whom. A nudge may not be the right instrument if the behavior or the setting is tied to strong preferences. For example, a nudge to promote healthy choices might be effective in a supermarket setting where people are still deciding what to eat that night, while the same nudge might be ineffective in a theme park where people just want to treat themselves to something nice (and unhealthy). Similarly, a nudge that would stimulate the choice for the only plant-based dish in a canteen may work when omnivorous customers are hungry and want to eat, but would be redundant for people who already adhere to a vegetarian diet. Thus, the potential of nudges would be largest when people do not have strong prior preferences (see Venema, Kroese, Benjamins, & De Ridder, 2019).

While providing relevant empirical evidence to an important research question, some limitations of the current studies should also be taken into account. While it is noteworthy that participants’ choices were real (i.e., not hypothetical) as they actually consumed the drink of their choice, the unnatural (lab) setting of the studies would probably still be the most important limitation. Selecting a drink is not something people would normally do by indicating their preference on a paper questionnaire (Studies 1 and 2) and it could be the case that – even though they were unaware that the drink selection was part of the study – participants felt observed and consequently were more inclined to go for the (modest, socially desirable) smaller cup than they would otherwise. However, we would expect results to be even stronger in more natural settings. It is quite plausible that, when participants decide to have a drink in a natural context, they would be driven by their personal preferences (thirst, liking of the drinks) to an even larger extent. On the other hand, for consumers with weaker preferences the potential effect of the nudge may well be larger in more natural settings, seeing that the room for improvement in the current study was quite small due to the large number of people that opted for the smallest cup size in all conditions.

Future research is needed to further scrutinize how personal preferences affect nudge effectiveness. This is a challenging area of research as preferences may not be stable over time and across different contexts. Attempts to capture current personal preferences within the nudge setting may preclude observing true naturalistic behavior. It would be worthwhile to find ways to reliably infer personal preferences (e.g., by looking at past behavior) and study how they affect nudge effectiveness. In addition, it would be interesting to systematically compare nudge effectiveness in domains where people do (e.g., healthy eating) or do not (e.g., selecting insurances) tend to have strong preferences. Our hypothesis would be that nudges are particularly effective in settings where people do not have strong preferences, for example due to indifference or conflicting preferences.

5.1. Conclusion

Altogether, the current studies demonstrate that nudge interventions are respecting of people’s personal preferences in the sense that both nudge-congruent and nudge-incongruent preferences still determined behavior regardless of the presence of a nudge. Besides contributing to theoretical knowledge of how and when nudges work, this empirical evidence may be valuable in ethical discussions about nudges as well as in policy considerations about where and when to implement nudge interventions.

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Declaration of Competing Interest

The authors report no conflict of interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodqual.2019.103744.

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