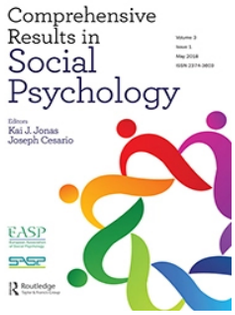

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The influence of nudge transparency on the experience of autonomy

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ABSTRACT
While nudges have been shown to be effective and are already being implemented, there is still a debate on the ethics of nudging. This debate specifically refers to the potential of nudges negatively affecting autonomy. It has been suggested that making a nudge transparent may resolve this issue. Whereas previous research has already demonstrated that transparency does not violate nudge effectiveness, it is unknown how transparency affects autonomy and related decision satisfaction and experienced pressure. In an online study with 905 participants, we investigated whether two variations of transparency influence the decision maker's experience of autonomy, as well as their choice satisfaction and the experienced pressure to choose the nudged option. The results show that autonomy and satisfaction were high – and pressure low – across all conditions, and were therefore not influenced by transparency. Suggesting that nudges do not negatively affect autonomy and that transparency does also not increase it.

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Nudging; transparency; autonomy; experienced autonomy

The Influence of Nudge Transparency on the Experience of Autonomy

In recent years, nudging has gathered a lot of attention both from scientists and policy makers. Nudging, the promotion of one choice without incentivizing or forbidding alternative options (Thaler & Sunstein, 2008), is regarded as an efficient and promising new manner of promoting desirable choices (Arno & Thomas, 2016; Matjasko et al., 2016). While nudging has been proven effective (Arno & Thomas, 2016), philosophers and scholars from other disciplines have argued that nudges may be manipulative to the extent that they violate autonomous decision making (Hansen & Jespersen, 2013). To tackle this issue, critics of nudging have suggested to make nudging interventions transparent, which can be broadly described as disclosing the presence of a nudge or its purpose to the decision maker. Previous research has demonstrated that transparency does not decrease nudge effectiveness, but whether transparency may also address concerns about the ethics of a nudge and affect autonomy is unclear. It thus remains to be tested whether making nudges transparent indeed benefits the decision makers' autonomy.

In the current study, we will investigate how transparency of nudges influences the decision maker's autonomy. In doing so, we acknowledge that transparency manipulations

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Supplemental data for this article can be accessed here.

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can differ. They may vary, for example, in the information given about the nudge's source, its working mechanism, etc., as well as for example, how the transparency message is phrased, and which parts are emphasized (e.g. Bruns et al., 2018; Kroese et al., 2015; Paunov et al., 2018). With the present study we acknowledge this heterogeneity in transparency manipulations, and test the effect of two different transparency messages on autonomy. One simply explains the aim of the default option and the other contains the same message but adds that people are usually unaware of this aim.

Nudges and its autonomy concerns

In *Nudge* (Thaler & Sunstein, 2008), Thaler and Sunstein have introduced the concept of nudges as a way of promoting desirable decisions without interfering with freedom of choice, which they characterize as 'libertarian paternalism'. The general idea is that the choice architect (whoever designs a choice situation) presents the choice in such a way that the desirable choice is promoted, with "desirable" referring to beneficial to the decision maker himself or to society as a whole. A typical example of a nudge is the rearrangement of products in a study by Kroese and colleagues (Kroese et al., 2015). Healthy food products were placed at the cash register in a kiosk, where many customers are inclined to make impulse purchases. The result of this proximity nudge was that people bought more healthy food products. This example illustrates that nudges do not forbid the non-promoted options (like unhealthy food options) nor do they incentivize buying the promoted option. However, it has been put in to question whether the inherent attribute of freedom of choice is sufficient to make nudges ethical (Bovens, 2009).

To understand why the ethics of nudging have been put into question, an understanding of how nudges work is needed. Typically, nudges work by speaking to heuristics. Heuristics are rules of thumb, which people frequently use to make decisions (Tversky & Kahneman, 1974). In the kiosk nudge example mentioned above, the salience heuristic is used. As people typically stand in front of the cash register waiting to pay, items close to the register grab the consumers' attention more easily because they are more salient, and items that get more attention are generally bought more frequently. The argument that nudges are unethical, and might violate the decision maker's autonomy, is based on the notion that people often use heuristics without being aware of them (Kahneman, 2011). It has been argued that nudges, by working through heuristics, bypass the rational, deliberative part of decision making. In doing so, nudges influence people in ways they are unaware of, which makes it almost impossible to protect themselves from the nudge's influence (Grüne-Yanoff, 2012; Hausman & Welch, 2010). If we again take the kiosk example, someone who is standing at the cash register of the kiosk will not be aware of the fact that the (new) placement of the healthy food products is aimed at increasing healthy choices. To protect people from their limited introspective awareness of the nudge being present, it has been suggested that making the nudge transparent may resolve this ethical issue (Bovens, 2009; Hansen & Jespersen, 2013).

Transparency

In the context of nudging, transparency refers to the nudge being disclosed to the decision maker. It has been argued that a transparent nudge, as compared to

a nonransparent nudge, is more ethical (Hansen & Jespersen, 2013), especially in terms of allowing for autonomous decision making (Bovens, 2009). The reasoning behind this is, that disclosure of the nudge allows the decision maker to make an autonomous decision based on his own values, rather than being unknowingly influenced by the nudge (Hansen & Jespersen, 2013). However, simultaneously it has been put into question whether nudges would still be effective, if made transparent (Bovens, 2009).

Since the case for transparent nudges has been made, a number of studies have tested whether transparent nudges can still be effective. These studies showed that transparent nudges are not less effective (Bruns et al., 2018; Kroese et al., 2015; Loewenstein et al., 2015; Steffel et al., 2016), with one study suggesting that transparency may even increase nudge effectiveness (Paunov et al., 2018). For example, in the kiosk study described above, displaying a sign next to the healthy food at the register displaying 'We help you make healthier choices' did not affect the degree to which the nudges promoted the purchase of healthy items. In another study (Bruns et al., 2018) participants were nudged with default values to donate money. In the transparent conditions, participants were either told that the default value might influence them, or that the default value was meant to encourage them to donate more, or both. Participants in these transparent conditions donated on average the same amount of money as in the nontransparent condition, suggesting that disclosure of the nudge did not influence nudge effectiveness. Thus, so far evidence suggests that nudges can be effective when they have been made transparent, negating the claim that transparent nudges would not be effective. However, neither of these studies specifically incorporated assessments of experienced autonomy which is why transparency manipulations were adopted in the first place.[1]

Variations of transparency

Even though, on first sight, making a nudge transparent may seem rather straightforward, the above mentioned studies on transparency already indicate that there are many different ways to make a nudge transparent. The study by Bruns and colleagues for example, made the nudge transparent in three different manners, they either disclosed the purpose of the nudge, the influential nature of defaults, or both (Bruns et al., 2018). While no difference in nudge *effectiveness* was found, we argue that the manner in which the nudge is made transparent may, however, influence its effect on the *autonomy* of the decision maker. That is, even though transparency messages give the decision maker, by definition, more information to base their decision on, they may not always result in a stronger experience of autonomy.

Specifically, we hypothesize that if the transparency message is focused strongly on the opaque nature of a nudge, participants will see the nudge as autonomy threatening, regardless of the fact that they have been made aware of the nudge and its purpose. To test this hypothesis, the current study utilizes two variations of transparency messages. In the transparent experimental conditions, participants will either be made aware of the nudge's purpose, similar to study by Bruns and colleagues (Bruns et al., 2018), or they will be made aware of the nudge's purpose and that most people are unaware of the nudge's purpose. We expect mentioning that people are usually unaware of the nudge's purpose will result in people feeling less autonomous, as they might then feel that someone is trying to manipulate or cheat them.

Associated concepts

Next to autonomy, we are also interested in associated concepts like experienced pressure and satisfaction with one's choice. Earlier studies showed, that nudges that are experienced as pressuring are also expected to be harmful to one's autonomy (Wachner et al., 2020). We want to test whether this relation also exists when people are actually nudged. Furthermore, we also found in earlier studies that if people think a nudge will harm their autonomy, they also think they will be less satisfied with their choice (Paunov et al., 2020). In the current study we will test whether people actually feel less satisfied with their choice when they are nudged. Policy makers should be alert about the autonomy and satisfaction that comes with making a choice, as experiences strongly predict future choices (Wirtz et al., 2003), and therefore negative experiences while making a desired choice should be strongly avoided.

The current study

The aim of the current study is to investigate whether transparent nudges, compared to nontransparent nudges, differ in their effect on experienced autonomy and to test the effect of highlighting that people are unaware of the nudge's purpose. To do so, we employ a previously tested nudge in which participants are asked to complete a longer or a shorter version of a questionnaire, which will be independent of their reimbursement (Paunov et al., 2020). Participants will either be nudged with a transparent nudge (either disclosing the nudge's purpose or its purpose and that most people are unaware of it) or a nontransparent nudge. At the end of the questionnaire, we will also ask participants whether they want to sign up for our notification list, where participants will be informed via the survey platform when new surveys by the same researchers are put online. In that way, we have a behavioral measure to investigate whether (different types of) transparency influences the willingness to work with the researchers in the future. We hypothesize that (1) we will replicate earlier studies that found transparency not to decrease the nudge's effectiveness (Bang et al., 2018; Bruns et al., 2018; Kroese et al., 2015; Loewenstein et al., 2015; Paunov et al., 2018; Steffel et al., 2016). (2) Participants who received a transparency message explaining only the purpose of the nudge score highest on experienced autonomy, participants without a transparency message will score lower, and participants who receive a transparency message explaining that most decision makers are unaware of nudges will score the lowest on experienced autonomy. We expect (3) the same order for choice satisfaction and (4) notification list sign-up ratio and (5) the inverted order for experienced pressure.

Method

Participants

A total of 905 participants was recruited via Prolific, an online platform where participants are paid per completed survey. Participants were eligible when they were fluent in English and did not participate in earlier studies on nudging on this platform. The experiment took about four minutes to complete and participants were paid 0.40 British pounds.

Design

The study used a one-factor between-subject design, with condition (nontransparent/purpose/unawareness and purpose) as independent variable and experienced autonomy, experienced pressure, choice satisfaction and nudge effectiveness as the dependent variables.

Procedure

Participants were first asked for their age, sex, and nationality. Then, they were asked whether they wanted to participate in the long or the short version of the questionnaire. All participants were presented with a default nudge to participate in the long version of the questionnaire. Participants in the nontransparent condition were presented with this question including the nudge without any further information. Participants in the purpose condition saw this question including the nudge and a message informing them about the purpose of the nudge. Participants in the unawareness and purpose condition saw the question including the nudge and a message informing them about the purpose of the nudge and an explanation that most people are unaware of this purpose.

Subsequently, participants filled out questionnaires on experienced autonomy, choice satisfaction, and pressure to take the long version of the questionnaire. They were also asked whether they wanted to sign up to a notification list. As a final question, participants were asked a single question to test whether they had paid attention during to the questionnaire, which served as a manipulation check. Afterward, participants were debriefed and thanked for their participation. The full questionnaire can be found in the supplementary materials.

Materials

Nudge

Participants were presented with the following statement: "Please indicate whether you will participate in the long version of this study (+5 minutes). You will not receive additional payment, however you will help to improve future questionnaires." An earlier study found that preselecting the option of the long version proved an effective nudge, increasing the percentage of participants choosing this option from 45% in the control condition to 61% in the default nudge condition (Paunov et al., 2020).

Transparency manipulation

Participants in the transparent nudge conditions were presented with one of two transparency messages, which have been adapted from a study by Bruns and colleagues (Bruns et al., 2018). In the *purpose* condition, participants read about the nudge's purpose. ("Please note the preselected default option. It is meant to encourage people to choose the longer version of this questionnaire.") In the *unawareness and purpose* condition, participants read that most people are unaware of the nudge's purpose and about the purpose itself. ("Please note the preselected default option. It is meant to encourage people to choose the longer version of this questionnaire. People are usually unaware of its influence.")

Autonomy

Autonomy was assessed by the autonomy subscale of the Basic Psychological Needs in Exercise Scale (Vlachopoulos & Michailidou, 2006), which in its original form measures autonomy in a physical exercise context, but was adjusted for this study to measure autonomy in a decision making context (Appendix A). It comprises four statements (e.g. "I feel very strongly that I had the opportunity to have influence on my choice."), which participants rated on a seven-point scale (from 1 'strongly disagree' to 7 "strongly agree"), that were averaged to a score on a scale from one to seven. In earlier studies (Paunov et al., 2020), this questionnaire (with a 5-point scale) had a good internal consistency of Cronbach's alpha between .84 and .89. In the current study, internal consistency was good, with a Cronbach's alpha of .76.

Satisfaction

Choice satisfaction was measured with the satisfaction with choice subscale of the Decision Attitude Scale (Sainfort & Booske, 2000), consisting of five statements (e.g. "My decision is sound"). Different from the original scale where participants rated these statements on a five-point scale, we used a seven-point scale (from 1 "strongly disagree" to 7 "strongly agree"; Appendix A). We changed this, because averages on this scale tend to be high and we think this is a way to lower the risk of a ceiling effect without dramatically changing the questionnaire. The five scores were averaged to one satisfaction score on a scale from one to seven. The internal consistency of the original scale is good with an alpha of 0.83 (Sainfort & Booske, 2000). In the current study, internal consistency was good, with a Cronbach's alpha of .77.

Pressure

Pressure was measured with one single question ("How much pressure have you felt to choose the longer questionnaire?"). Participants respond on a slider with labels on the both extremes ("None at all" – "Extreme Pressure") and the scores range from zero to a hundred.

Manipulation check

To test whether participants' had paid attention to information revealing the purpose of the nudge, participants had to answer "Which of these statements did we make when we asked you earlier:" followed by the nudge question (see above under Nudge). The three possible answers are the statement that is added in the purpose condition, the statement added in the unawareness and purpose condition, and "None of the above."

Notification list

To test whether participants' willingness to work with the researcher's differs by condition, we asked participants whether they wanted to sign up to get notifications whenever the researchers run a new survey. Participants could either answer "Yes" or "No."

Power analysis

To estimate the needed sample size for this study, we first identified which of the confirmatory statistical tests that we wanted to conduct for this study required the most participants, when keeping standardized effect size constant across all tests. That was the

Tuckey HSD post-hoc test, which we used to test for significant differences between the conditions in terms of autonomy, satisfaction, and experienced pressure. If we had enough power for this test, we would have enough power for all other confirmatory tests. To simulate how many participants we needed we used the statistical software R (R Core Team, 2019). The code we wrote (see Supplementary Materials) must be provided with the statistical power we aim for (beta = .8) and the maximum chance for a type I error (alpha = .05). Finally, it must be provided with the smallest effect size we are interested in. The code then simulate a sample of 750 participants, equally distributed across three conditions, each participant having a score. The scores were simulated, so that the scores of condition one and two have a difference of the smallest effect size we are interested in, condition two and three have the same difference, thus condition one and three have a difference double the size. The code then performs a Tukey HSD post-hoc test to see whether every condition differs from every other condition. If all three tests have a p value smaller than .05, the test is seen as successful, if one of the p values is bigger, the test is seen as unsuccessful. In total, 1000 times a set of 750 participants (250 per group) is generated and tested. If in at least 800 of the 1000 simulations the test was seen as a success, we have reached a power of at least beta = .8, if not, thirty participants are added, and 1000 samples are simulated until the power is achieved. We first entered a Cohen's d of $d = .2$ as smallest effect size of interest, which resulted in a needed sample size of 2040. We increased the smallest effect size of interest to $d = .3$, which resulted in a needed sample size of 900 participants. We decided for a sample size of 900, as we feel it is a good balance between expense of the study and ability to find small effect sizes.

Analysis plan

All data analyses were conducted using the statistical software R (R Core Team, 2019). The script that we used can be found in the supplementary materials.

Exclusion criteria

Participants were excluded from all analyses, if they contacted the researchers to inform them about troubles they had with the questionnaire. Next to that, participants' data were excluded from all analyses if they failed the manipulation check. However, if more than 5% of the participants have failed the manipulation check, we would also run the tests below *including* participants that failed the manipulation check. We would then report all instances where including these participants changed a result from significant to nonsignificant and vice versa.

Nudge effectiveness

To test whether the nudges varied in their effectiveness between the conditions, we used logistic regression. We created three dummy variables, one for each condition, which indicated whether participants were in a specific condition or not. We then first ran a logistic regression with participants' choice on the nudged questions as the dependent variable, and the purpose dummy variable, as well as unawareness and purpose dummy variable, as the independent variables, in order to compare them to the control condition. Afterward, we ran another regression with the same dependent variable, but this time

with the control dummy variable and the purpose dummy variable as the independent variable. Thereby the unawareness and purpose condition became the reference group.

Autonomy, satisfaction, and pressure

The analyses of experienced autonomy, satisfaction with the choice, and the experienced pressure to choose the long version of the questionnaire, are similar. We did, for each of these dependent variables, conduct an ANOVA with the condition as the independent variable. When an ANOVA showed that the three conditions were significantly different, we conducted a Tukey HSD post hoc test, to compare all three conditions with each other individually.

Notification list

To test whether a nudge's transparency affects the likeliness that participants sign up to work with the researchers in the future, we ran analyses similar to the nudge effectiveness analyses. We first ran a logistic regression with notification sign up status as the dependent variable, and the purpose dummy variable, as well as unawareness and purpose dummy variable, as the independent variables. Afterward, we ran another regression with the same dependent variable, but this time with the control dummy variable and the purpose dummy variable as the independent variable.

Exploratory analysis

Finally, if we found as described above, that the conditions differ in their sign-up ratio, we wanted to investigate whether this difference was mediated by experienced autonomy. As our study might have been underpowered in regards to this hypothesis, the results should be taken with some caution.

Results

Exclusion criteria

No participant contacted us about problems they had with the survey, therefore no data was excluded in connection to this reason. We found that of the initial sample of 905 participants, 30.4% of the participants failed the manipulation check, specifically, 19.5% of the control condition, 31.6% of the purpose condition and 40.1% of the purpose and unaware condition, resulting in a final sample of 630 participants. In the following, we will report the results from analyses of the final sample (only participants who passed the manipulation check). Results from the analyses of the initial sample (including participants who failed the manipulation check) are reported in the supplementary materials, and will be briefly mentioned below when they lead to a different conclusion in terms of statistical significance.

Randomization check and descriptives

Of the 630 participants who passed the manipulation check, 259 (41.1%) were female, which is comparable to distribution of the initial sample (41.3%). The final sample has

a mean age of 27.1 (*SD* = 9.48), which is again comparable to the initial sample (*M* = 27.7, *SD* = 10.0). Two ANCOVAs, with age as a covariate, sex as an independent variable, and condition as the independent variable, were conducted to test whether randomization was successful. The initial sample, as well as the final sample, showed no significant differences between conditions in terms of age or sex (all $p \geq .147$).

Table 1 depicts an overview of means and correlations between the most prominent variables and shows that autonomy is related to satisfaction and pressure, as well as choice in such a way that people who chose to follow the nudge tended to score higher on autonomy. It is noteworthy that participants scored on average fairly high on autonomy (5.25 out of 7) and on satisfaction (5.60 out of 7), especially since they were nudged in all three conditions. The only differences in the findings in comparison to the initial sample were that age was negatively correlated with the experience of pressure, and women were more likely to follow the nudge (the table for the initial sample can be found in the Supplementary Materials).

Nudge effectiveness

Two logistic regressions, one with the control condition as the reference group and the other with the purpose condition as the reference group, showed that the control condition (48.1%), the purpose condition (56.3%), and the purpose and unaware condition (51.9%) did not differ significantly from each other with regard to how often the nudged option was chosen (all $p \geq .084$). These results are in line with our first hypothesis that the three conditions do not differ in terms of effectiveness of the nudge.

Autonomy, satisfaction with choice, and pressure

We expected the purpose condition to score higher on autonomy and satisfaction and lower for pressure as compared to the control condition. Likewise, we expected the pressure and unaware condition to score lower on autonomy and satisfaction and higher for pressure compared to the control condition. We conducted three ANOVAs with

Table 1. Means, standard deviations, and correlations with confidence intervals.

Variable	*M*	*SD*	1	2	3	4	5	6
1. Autonomy	5.25	1.00						
2. Satisfaction	5.60	0.91	.49**					
			[.43, .55]					
3. Pressure	32.20	28.89	−.15**	−.32**				
			[−.22, −.07]	[−.38, −.24]				
4. Choice	0.52	0.50	.20**	.19**	−.19**			
			[.13, .28]	[.11, .26]	[−.26, −.11]			
5. Sign-up list	0.87	0.33	.03	−.03	−.01	.16**		
			[−.05, .11]	[−.10, .05]	[−.09, .07]	[.08, .23]		
6. Age	27.14	9.48	.03	.12**	−.03	.10*	−.07	
			[−.05, .10]	[.04, .19]	[−.10, .05]	[.02, .18]	[−.15, .01]	
7. Sex	1.42	0.50	−.01	.16**	.07	.03	−.02	.15**
			[−.09, .07]	[.08, .23]	[−.01, .15]	[−.05, .11]	[−.10, .05]	[.08, .23]

Note. M and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < .05$. ** indicates $p < .01$.

autonomy, satisfaction, and pressure as the dependent variable, respectively, and condition as the independent variable.

For autonomy, we found no significant difference between the control condition (M = 5.17, SD = 0.67), the purpose condition (M = 5.12, SD = 0.68), and the purpose and unaware condition (M = 5.24, SD = 0.66) $F(2,627) = 1.32$, $p = .268$. The same is true for satisfaction, where the control condition (M = 5.64, SD = 0.88), the purpose condition (M = 5.59, SD = 0.96), and the purpose and unaware condition (M = 5.57, SD = 0.91) did also not differ significantly $F(2,627) = 0.396$, $p = .673$. For pressure, again we found no significant differences between the control condition (M = 29.78, SD = 29.16), the purpose condition (M = 32.81, SD = 27.87), and the purpose and unaware condition (M = 34.75, SD = 29.57) did not differ on pressure $F(2,627) = 1.603$, $p = .202$. The results on autonomy, satisfaction, and pressure all contradict our hypotheses that the purpose condition would score the most favorable, and the purpose and unaware the most unfavorable.

Notification list

A logistic regression with notification sign-up as the dependent variable and condition as the independent variable, showed, that the control condition (87.2%), the purpose condition (85.4%), and the purpose and unaware condition (89.5%) did not differ in their sign-up rate (all $p \geq .232$). Again, these results do not support our hypothesis.

Exploratory

As we did not find clear evidence in our sample for the effect of condition on sign-up ratios, we did not conduct a mediation analysis.

In order to test whether the conditions did indeed not differ on autonomy, satisfaction, and pressure, we conducted equivalence tests, using the TOSTER package for R (Lakens, 2017). We always compared the condition that scored highest on a variable, compared to the condition that scored the lowest. By doing so, we tested whether we could reliably state that these conditions did not differ in a meaningful way, in our case that is an effect-size of Cohen's $d = 0.3$ or $d = -0.3$, with a Type 1 error of alpha = 0.05. For autonomy, we compared the purpose condition (M = 5.12, SD = 0.68) and the purpose and unaware condition (M = 5.24, SD = 0.66) and the equivalence test was nonsignificant, $t(381.19) = 1.188$, $p = 0.118$, meaning the difference between these conditions is not equivalent to zero. For satisfaction, we compared the control condition (M = 5.64, SD = 0.88) and the purpose and unaware condition (M = 5.57, SD = 0.91) and the equivalence test was significant, $t(380.7) = -2.253$, $p = 0.0124$, meaning the difference between the conditions is statistically equivalent to zero. Finally, for pressure we again compared the control condition (M = 29.78, SD = 29.16) and the purpose and unaware condition (M = 34.75, SD = 29.57), and the equivalence test was nonsignificant, $t(384.97) = -1.722$, $p = 0.0859$, meaning the difference between the conditions is not statistically equivalent to zero.

As we (surprisingly) did not find differences on autonomy between the three conditions, we decided to also look at the four items of the autonomy scale individually. We conducted four separate ANOVAs, each with item of the autonomy scale as the

dependent variable, and condition as the independent variable. None of the four ANOVAs showed any significant differences between the conditions (all $p \geq .141$).

Similarly, we conducted five ANOVAs to test the individual items of the satisfaction questionnaire. While the four of the items did not significantly differ between the conditions (all $p \geq .448$), the conditions did significantly differ on the fifth item ("It was difficult to make a choice.") F (2,627) = 3.289, p = .038. A Tukey HSD post hoc test, however, showed that the unaware and purpose condition (M = 4.80, SD = 1.83) scored only marginally significantly lower on item five, compared to the control condition (M = 5.18, SD = 1.65, p = .056), as well as the purpose condition (M = 5.17, SD = 1.51, p = .070).

Discussion

The current study investigated whether the transparency of nudges, meaning either disclosing the nudge's purpose or disclosing its purpose in combination with information that most people are unaware of the presence of nudges, would influence the decision maker's experienced autonomy and related constructs. Many studies have tested and rejected the notion that transparency decreases nudge effectiveness (Bruns et al., 2018; Kroese et al., 2015; Loewenstein et al., 2015; Steffel et al., 2016). Remarkably, however, no study has yet tested the claim that is at the root of the argumentation for a need of transparency, namely that nudges threaten autonomy, and that transparency would eliminate this threat.

In contrast to our hypotheses, we found no evidence that transparency of purpose and/or workings of nudges affects autonomy. In fact, all conditions, including the nontransparent nudge condition, reported similar *high* levels of autonomy and choice satisfaction, and reported to have experienced little pressure. Overall, the present study convincingly demonstrates that the employed transparency manipulations do not affect subjective autonomy in relation to decision making, However, our findings also raise a novel issue in relation to postnudge autonomy. That is, the overall observed high levels of autonomy beg the question whether there even is a need to shield autonomy upon being nudged in the first place. As stated earlier, the need for transparency in nudges is mainly defended from the perspective that nontransparent nudges would hurt the decision maker's autonomy. This claim, however, does not seem to be grounded in, nor be supported by, empirical data on autonomy in relation to nudging. They are rather based on perceptions and expectations regarding nudging and decision making.

Indeed, in a recent study, we found that participants who are encouraged to reflect on how nudges might affect their autonomy do expect that default nudges will harm their autonomy, as well as choice satisfaction (Paunov et al., 2020). However, when another group of participants actually encountered the same (default) nudge, they do not in reality experience lower autonomy or choice satisfaction. This finding is in line with a considerable amount of research that concludes that people are bad forecasters, as they perform poorly at predicting emotional responses (Dunn et al., 2009; Gilbert & Wilson, 2000), the likelihood of specific events to occur (Wilson et al., 2000), or their reactions to future events (Buehler & McFarland, 2001), and tend to use their current state as an anchor for the predictions of future states (Loewenstein, 1996; Loewenstein et al., 2003). Supported by the findings from the present study, this may

signal that not only is transparency an ineffective solution (as it does not improve autonomy), it may even target a nonexistent problem (as autonomy is still high after being nudged).

However, before concluding that transparency manipulations do not have a beneficial effect on nudging, or concluding that autonomy is not harmed by nontransparent nudges in the first place, it is important to consider that in the present study the type of decision participants were required to make may not have been very involving and did not have a large impact on their lives as it "only" concerned the spending of an extra five minutes. For that reason, before drawing any firm conclusion, future studies should examine whether our results can be replicated with behavior that requires more effort (e.g. plastic recycling) and/or represents behavior they are deeply concerned with (e.g. organ donation). Alternatively, while the overall levels of autonomy were relatively high, it is unclear what the reference or baseline level of autonomy is or ought to be. That is, in the present study participants in all three conditions were exposed to a nudge. Whether or not the relatively high reported levels of autonomy and choice satisfaction were lower compared to a control condition in which no nudge was present therefore remains a question for future research.

In addition to providing interesting insights regarding our main aim – the effects of transparency on autonomy – the present study also furthers insights into the effect of transparency manipulations on nudge effectiveness. The very notion that transparency might be beneficial to autonomy has been derived from the claim that when a decision maker has a clearer and more detailed understanding of the decision context, they have the opportunity to bring their decision more in line with their own values (Bovens, 2009). However, as our study and most other transparency studies show, transparency does not affect nudge effectiveness (Bruns et al., 2018; Kroese et al., 2015; Loewenstein et al., 2015; Steffel et al., 2016), leaving the question whether transparency does indeed influence people's decisions. It has to be noted that while earlier studies did not report on the proportion of participants that read and understood the transparency messages (e.g. Kroese et al., 2015), the current study included a manipulation check, allowing us to distinguish between participants who did or did not recollect the transparency message. While we cannot conclude that choices were altered on an individual level, the transparency manipulation did not change participants choices on a group level. This further weakens the argument for any meaningful effect of transparency as it neither promotes the decision maker's autonomy, as elaborated earlier, but also does not alter the decision maker's choice.

The present study has limitations, and possible solutions to them will be addressed below. First, while our transparency messages were carefully selected, and in earlier studies shown to – in hypothetical settings – threaten autonomy, they are not generalizable to all transparency messages. Two studies by Paunov and colleagues (Paunov et al., 2018, 2020) did find a positive effect of transparency messages on nudge effectiveness. While these findings need corroboration, they emphasize that effects of transparency studies depend on the exact wording of transparency messages so as to contribute to a sophisticated and empirically based understanding of transparency effects of nudging. Similarly, our findings on the effects of transparency on autonomy concern merely one type of nudging and two variations of transparency. Therefore, more research is needed in order to fully understand the mechanisms behind transparency in nudges and its effects on experienced autonomy.

Second, in the current study almost a third of our initial sample failed the manipulation check. While our analyses with and without participants who failed the manipulation check are almost identical and thus support the robustness of our findings, it is still somewhat concerning that so many participants failed to notice a message revealing the nudge purpose and working mechanisms to them. However, failing to process the nudge warning may be due to our online study design. Sampling participants online, through platforms such as prolific, bears the risk that these participants fill out the questionnaires much faster than expected and thereby have a higher tendency of failing manipulation checks. However, the failure rate usually is not as high as 30%. The high number of participants who failed to noticed the transparency message may also relate to the very nature of nudges, as has been found in previous studies showing that people often overlook transparency messages (Kroese et al., 2015). We argue that these two factors in combination could explain the high manipulation check failure rate. While the first factor is related to the study and is harmful to the external validity of our results, the second reason is inherent to transparency, and is therefore relevant for the understanding of real world effects. In order to tackle this dilemma, we argue that future transparency research should include both attention checks and manipulation checks, in order to distinguish between participants who fail to pay attention to the questionnaire overall, and people who fail to pay attention to the transparency message, as the former should be excluded while the latter should be included.

Conclusion

While more research is needed to fully understand the effects of transparency in nudges, our study is the first to suggest that transparency messages do not increase autonomy although the absence of an effect is arguably due to already high levels of autonomy regardless of transparency. So while we acknowledge that the idea of protecting decision maker's autonomy through transparency is a valid one, our results show that transparency is neither necessary, nor required, to safeguard autonomous decision making. That being said, by no means do our results deny that, viewed from a public policy perspective, nudge transparency is a prerequisite considering that governments should implement only those policies that they would be willing and able to defend publicly to citizens (Thaler & Sunstein, 2008).

Note

1. Bruns and colleagues (2018) did investigate whether transparency influences Threat to Freedom, which is related to autonomy and pressure. However, Threat to Freedom focusses more on the participants' opinion of the *intentions* of the default option, while we will focus on the subjective *experience* of autonomy.

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Appendices

Appendix A

Autonomy Questionnaire

Please indicate how you feel about your decision concerning the questionnaire length.

My decision is highly compatible with my goals and interests.
I feel very strongly that my decision perfectly fits my taste.
I feel that my decision is definitely an expression of myself.
I feel very strongly that I had the opportunity to have influence on my decision.
(Strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree)

Satisfaction with Choice Questionnaire

Please indicate how you feel about your decision concerning the questionnaire length.

My decision is sound.
I am comfortable with my decision.
My decision is the right one for my situation.
I am satisfied with my decision.
It was difficult to make a choice.*
(strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree)
Statements with an asterisk are mirrored questions.