

Do Nudges Harm Autonomy?
**Empirical Studies on the Effect of Nudges on Expected and
Experienced Autonomy**

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Do Nudges Harm Autonomy?

Empirical Studies on the Effect of Nudges on Expected and Experienced Autonomy

Schaden Nudges Autonomie?

Empirische Studies naar het Effect van Nudges op Verwachte en Ervaren Autonomie

(met een samenvatting in het Nederlands)

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Chapter 1

General Introduction

Acknowledgement of author contributions:

JW conceptualized and wrote this chapter.

So, you have chosen to read this book. But was it really your own, autonomous decision to read this dissertation? Maybe you were advised to read it by a colleague? Would it then still be your own decision? What if your partner, who knows about your weakness for movies, put this dissertation in the very place where typically the TV remote is? Was it still your own decision, or did your partner manipulate you? This last scenario is a good example of a nudge, which is a change in the way one's options are presented, without forbidding other options.

In this dissertation, empirical research is presented to answer the question about how autonomous people feel after having been nudged and how different kinds of nudges vary in their effect on autonomy. In this introductory chapter, I elaborate on the definition of nudging and how nudges change behavior, then I introduce the main topic of this dissertation, which concerns the question whether and how nudges may affect the experience and expectation of autonomy.

What nudges are and how they work

In 2008, economist and Nobel Prize winner Richard Thaler and legal scholar Cass Sunstein published *Nudge: Improving Decisions About Health, Wealth, and Happiness*, introducing a novel approach to the field of behavior change. They define a nudge 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). The architecture of the choices can be taken literally, for example, the placement of certain products in a supermarket at eye level increases sales of those products (Van Herpen, Van Nierop, & Sloot, 2012). However, the architecture of the choices can also be taken less literally, for example, when laws are changed so that every citizen who does not formally object becomes an organ donor, which increases the rates of organ donors (Johnson & Goldstein, 2003).

One critical feature of a nudge is that its use does not lead to the elimination of other options or to making it significantly more difficult or more costly to choose an alternative option. So, for the above-mentioned examples to be nudges, customers of the supermarket should still have the option to choose from products placed above and below eye level, and citizens should be able to easily object to being an organ donor.

Thaler and Sunstein consider nudges to be a form of liberal paternalism, as they differ from other behavioral interventions by finding a balance between a liberal approach (i.e., letting decision makers make their own choice from a full set of options) and a paternalistic approach (i.e., the decision designer knows what the best option for the decision maker is and promotes this option).

While different kinds of nudges exist, most nudges, rather than making a rational argument about the decision itself, typically aim to change behavior by strategically making use of biases and of the mental shortcuts humans take. An example is the status quo bias, which is the tendency to stick with the choice that is already selected (Moshinsky & Bar-Hillel, 2010; Jachimowicz, Duncan, Weber, & Johnson, 2019). This bias is one of the mechanisms that allow for nudges, where one option is set as the default (i.e., the option that will be chosen if the decision maker takes no action). Other examples of nudges are suggesting that one option is the popular one (social norm), which people are then more likely to choose (Venema, Kroese, & De Ridder, 2018; Czajkowski, Zagórska, & Hanley, 2019), or allowing people to choose the amount they would like to donate while giving a high amount as an example, prompting donors to choose an amount close to the given example (anchoring effect; Hysenbelli, Rubaltelli, & Rumiati, 2013). So, while nudges can take various forms, they predominantly share the characteristic of relying on decision makers' tendency to use mental shortcuts.

Effects of Nudging

The aim of nudges is to promote the option that is most beneficial to either the decision maker or society, or both. Effects of nudges are thus determined by examining whether the promoted option is chosen more frequently when the nudge is present. The use of nudges has been proven effective in various fields, such as dietary behavior (Arno & Thomas, 2016; Broers, De Breucker, Van den Broucke, & Luminet, 2017), tax compliance (Antinyan & Asatryan, 2020), electricity conservation (Buckley, 2020), and towel reuse in hotels (Nisa, Varum, & Botelho, 2017). Moreover, meta-analyses on nudges across all fields have concluded that nudges are effective (Hummel & Maedche, 2019), and calculations regarding the cost effectiveness of nudge interventions often compare favorably with traditional interventions such as tax incentives and other financial inducements (Benartzi et al., 2017), making nudges efficient in changing behavior. Many countries have already institutionalized Behavioral Insights Teams that use nudges for public policymaking, including Australia, Canada, the United Kingdom, and the United States.

Despite their effectiveness, the use of nudges remains controversial. Critics argue that next to the desired effect of promoting a certain option, nudges might also generate unwanted negative effects. One particular claim that has generated much debate—namely the claim that nudges negatively affect a decision maker’s autonomy—deserves further investigation and is therefore discussed more specifically (Bovens, 2009; House of Lords, Science, and Technology Select Committee, 2011; Hansen & Jespersen, 2013).

Importance of Autonomy

Four reasons why autonomy is important and specifically why nudges should aim not to harm autonomy are discussed: autonomy’s impact on general well-being, the potential damage of harmed autonomy on repeated decision making, the connection between harmed autonomy and psychological reactance, and the importance of autonomy in itself.

Autonomy is an essential construct in self-determination theory (SDT; Ryan & Deci, 2000) and is, alongside competence and relatedness, considered a basic need essential for well-being (Ryan & Deci, 2017). SDT postulates that these basic needs play an important role in mental and physical well-being, as well as in personal growth. Given SDT's prominent position in the psychological literature, there is a vast body of literature supporting the claim that autonomy plays an important role in well-being (Wei, Shaffer, Young, & Zakalik, 2005; Milyavskaya & Koestner, 2011; Van den Broeck, Ferris, Chang, & Rosen, 2016; Yu, Levesque-Bristol, & Maeda, 2018). Specifically, Yu and colleagues (2018) conducted a meta-analysis on the relationship between autonomy and self-reported well-being and found a moderate correlation ($r = .46$). Additionally, Milyavskaya and Koestner (2011) asked participants to fill out questionnaires about important life domains in which they were involved, as well as their basic need satisfaction and well-being. The results show that basic need satisfaction predicts 51% of the variance in well-being across all domains and that motivation partially explains this relationship. It was thus concluded that the satisfaction of basic needs not only directly and positively affects well-being, but also indirectly does so by positively influencing motivation, which in turn increases well-being (Milyavskaya & Koestner, 2011). This means that if nudges have a negative effect on autonomy—and thereby well-being—they could decrease or outweigh the benefits of the direct behavior change that nudges induce.

A second reason why autonomy is important is that decreased autonomy may not only compromise well-being but also lead to lower satisfaction with one's choice. As experiences in previous choices predict future choices (Wirtz, Kruger, Scollon, & Diener, 2003), a paradoxical effect could occur where the nudged option is less likely to be selected in subsequent decision moments as it is associated with harmed autonomy or dissatisfaction with the choice in general. Note that this might even be the case if the decision makers are

not aware of the presence or the effect of the nudge, as long as the dissatisfaction is associated with the choice instead of the nudge itself. This might prove a crucial downside considering that many nudges are designed for recurring decisions (e.g., recycling, healthy diet, exercising). For nudged one-time decisions (e.g., retirement savings plans, organ donation registration), this issue concerning repeated decision making is less important. However, the majority of nudges aim to tackle repeated choices.

A third reason why autonomy is important is that the decision makers might feel that nudges pressure them to make a certain decision. Pressure may affect the experience of autonomy to the extent that people may feel being directed to a specific decision that they would not have chosen without a nudge being present. Reactance theory claims that if people feel their behavioral freedom is reduced or threatened, they are motivated to regain that freedom (Brehm & Brehm, 1981). In behavioral change interventions, this reactance manifests itself in the decision maker deciding against the recommended behavior (Reich & Robertson, 1979). That means that if the decision maker feels too much pressure by the nudge, the nudged option is less likely to be selected.

Finally, autonomy is important, as making the decision maker's decision less autonomous would be an ethical problem on its own. While nudges are claimed to be paternalistic *and* libertarian, several papers have questioned this notion (Mitchell, 2004; Veetil, 2011; Bovens, 2009; Hansen & Jespersen, 2013). In the presence of a nudge, the decision maker's ability to choose any option they would like is protected, which is seen as the main argument for nudges to be libertarian (Thaler & Sunstein, 2008). However, the nudge might alter the way a decision maker approaches and thinks about a decision. In the earlier-mentioned donation example, people are free to donate any amount they like, but they will donate higher amounts if a high example amount is mentioned. This is due to the decision maker then approaching the decision by taking the example amount as a reference

point and adjusting it to their preference (i.e. anchoring effect; Hysenbelli et al., 2013). Effects like this make it questionable whether nudges are easily resistible and whether decision makers are able to choose any option they would like. This, in turn, makes it questionable whether nudges are libertarian and allow the decision maker to decide autonomously.

Conceptualizations and Distinctions of Autonomy

There are several distinctions and conceptualizations made within the autonomy literature. Vugts and colleagues (2020), for example, examined 33 articles on nudging and autonomy and identified three conceptualizations of autonomy: Freedom of Choice, Agency, and Self-Constitution. Freedom of Choice refers to the opportunity to make one's decision on a full set of options, which is violated in cases where options are taken away or when the decision maker is forced or coerced to act in a specific way. However, since by definition nudges do not take away alternative options and should be easily avoidable (Thaler & Sunstein, 2008), they cannot limit the set of options the decision maker has or force or coerce the decision maker to act in a specific way that is not easily avoidable. It can therefore be concluded that nudges in principle do not harm autonomy conceptualized as Freedom of Choice.

The concept of Agency builds on Freedom of Choice but also requires the decision maker to have the capacity to choose and to decide free from manipulation. Having *Agency* means to make one's decisions based on reasons and intentions, without one's reasoning being taken over by others. However, as mentioned earlier, nudges primarily make use of humans' tendency for mental shortcuts in order to promote an option, avoiding any change of deliberative thoughts and focusing instead on automatic thought processes. Take, for instance, a default nudge that makes use of the status quo bias. Although people will be more likely to choose the default option, this likelihood is not based on any deliberative reasoning

by the decision maker. In line with that, Bovens (2009) states that decisions based on mental shortcuts are irrational, arguing “what is driving my action does not constitute a reason for my action” (p. 210). Thus, nudges that rely on biases and mental shortcuts, and work around reasoning, might be a threat to autonomy conceptualized as *Agency*.

The concept of *Self-Constitution* builds on *Agency* but also deals with the decision maker’s identity. Decisions should reflect decision makers’ self, their identity, and their values. A threat to *Self-Constitution* would be indoctrination, where decision makers are made to endorse ideas and values that are not their own. Vugts and colleagues (2020) argue that nudges might harm autonomy conceptualized as *Self-Constitution* if the decision maker has repeated contact with choice situations designed to promote a specific value.

Two More Distinctions of Autonomy

One aspect of autonomy that needs further inspection is how it is measured. In the current dissertation, autonomy is always measured through self-report, so decision makers judge their own autonomy. That means that subjective autonomy is measured as opposed to objective autonomy. Subjective autonomy is autonomy as it is experienced by decision makers themselves, while objective autonomy is the factual autonomy of decision makers. Take, for example, the case of a customer who wants to buy a car, but the car salesperson decides to only show upper-class models based on the assumption that the customer can spend ample money. The customer would likely think their choice was an autonomous decision due to being unaware of the fact that not all cars were presented. Objectively, however, the customer did not choose from the full set of options, and the choice was therefore not autonomous.

Most negative consequences stemming from harmed autonomy were found with self-reported (i.e., subjective) autonomy (Wei et al., 2005; Milyavskaya & Koestner, 2011; Van den Broeck et al., 2016; Yu et al., 2018). However, the argument of the ethicality of making

one's choice less autonomous is based on objective autonomy. This distinction is especially important when discussing nudges, as decision makers might be unaware of the nudge and therefore unaware that their autonomy might be compromised. For the present dissertation, autonomy is measured through self-report, so the findings will prove insightful for the factors of well-being and future decisions of the decision maker; however, if no adverse effect of nudges on subjective autonomy is found, the findings will give no definitive answer on the question regarding whether nudges are an ethical problem due to harmed objective autonomy. Nevertheless, ethicists should consider what it means for objective autonomy if individual subjective autonomy remains unharmed by nudge exposure.

Another distinction relevant to this dissertation is that of experienced and expected autonomy. Several studies conducted for this dissertation confront participants with hypothetical scenarios where a nudge is explained and participants report their expectations about how autonomous they would feel if they made a decision in the explained scenario. Participants therefore report their *expected* autonomy. Note, also, the decision to measure expected autonomy as a mere proxy for experienced autonomy. Research shows that people are poor predictors of emotional responses (Gilbert & Wilson, 2000; Dunn, Forrin, & Ashton-James, 2009), of the likelihood that certain events will occur (Gilbert & Wilson, 2000), and their own reactions to future events (Buehler & McFarland, 2001). Instead, expected autonomy is relevant to how nudges are seen by society. All in all, understanding the influence of nudging on both expected and experienced autonomy have merit on their own and should not be conflated and are therefore both studied in this dissertation.

Evidence of the Effect of Nudges on Autonomy so far

To date, not much empirical evidence has been collected on the effects of nudges on autonomy. While several scholars have discussed the possible negative impact of nudges on autonomy (Bovens, 2009; House of Lords, Science, and Technology Select Committee, 2011;

Hansen & Jespersen, 2013), empirical data on this issue remains limited; the few relevant empirical findings are discussed in the following.

Investigating hypothetical nudges, Friedman and colleagues (2018) presented clinicians and laypeople with scenarios in which nudges were used on patients to promote either chemotherapy or hospice care. The results show that both clinicians and laypeople did not see the nudge as autonomy threatening, and, in some cases, they even viewed them as autonomy enhancing (Friedman et al., 2018). However, participants rated the autonomy from a third-person viewpoint rather than imagining they would be nudged themselves, leaving unclear exactly how these results would translate into expected or experienced autonomy. Regarding nudge acceptance, research shows that overall support for nudges is high (Sunstein, Reisch, & Kaiser, 2019). Factors that are related to acceptance are trust in public institutions (Sunstein et al., 2019) and the perceived effectiveness of the nudge (Djupegot & Hansen, 2020). Furthermore, people find nudges more acceptable if the goal of the nudge is in line with one's personal goals (Venema et al., 2018). Additionally, acceptance is positively correlated with the perception of freedom of choice (Djupegot & Hansen, 2020), which makes it likely that relationships found with nudge acceptance are similar for *experienced* autonomy. Finally, regarding nudge transparency, research has been conducted on the claim that nudges are exclusively effective if the decision maker is unaware of the nudge (Bovens, 2009). A handful of empirical studies have shown that if a nudge is made transparent (i.e., its presence, purpose, and/or working mechanisms are pointed out to the decision maker), it is still as effective as a non-transparent nudge (Kroese, Marchiori, & De Ridder, 2015; Loewenstein, Bryce, Hagmann, & Rajpal, 2015; Steffel, Williams, & Pogacar, 2016; Bruns, Kantorowicz-Reznichenko, Klement, Jonsson, & Rahali, 2018; Paunov, Wänke, & Vogel, 2018; Paunov, Wänke, & Vogel, 2019). Should nudges harm autonomy, transparency might be used to reduce nudges' influence on autonomy without compromising effectiveness.

However, whether or not nudges indeed harm autonomy and whether transparency manipulations aid in preserving or increasing autonomy remains to be investigated and is one of the issues that will be addressed in this dissertation.

The Present Dissertation

For the current dissertation, we investigate how people expect nudges to influence their autonomy and how they actually experience autonomy after being nudged. In addition to autonomy, we investigate supplementary measures of choice satisfaction, pressure, and competence. Additionally, it will be investigated whether and how transparency manipulations affect autonomy.

As mentioned earlier, lower feelings of autonomy might lead to lower satisfaction with the choice, which might make the nudge ineffective in subsequent decision moments. As none of the studies for this dissertation utilize repeated decision moments, this claim is not fully investigated; however, we do investigate the relationship between autonomy and satisfaction with the choice. Besides autonomy and satisfaction, we measure participants' experienced pressure to choose the nudged option. Research on psychological reactance, as elaborated on earlier, predicts that, if the decision maker experiences too much pressure, they will act against the intentions of the nudge. Finally, the expectation or experience of competence in decision making is measured. The importance of autonomy for well-being is best researched in SDT, which assigns the same importance to competence and relatedness. Given that relatedness might be irrelevant to many nudges, we focus on competence as an additional measurement to explore other negative influences that nudges may impose. The four concepts mentioned above (i.e., autonomy, satisfaction, pressure, and competence) are investigated in almost every study of this dissertation. Furthermore, various other measures are explored in individual studies.

Research Aims

The current dissertation aims to gather a better understanding of the impacts of nudges on experienced autonomy, an issue that has been frequently discussed but not empirically tested. Besides that, how different kinds of nudges vary in their potential effect on autonomy is investigated (Chapters 2 and 3) as is whether the amount of information participants had on the nudge influences their autonomy (Chapters 2, 3, and 4).

This dissertation was conducted with the goal of making the research as easily accessible and replicable as possible. All published papers are therefore openly accessible to the public. In addition to the main texts, for all studies, detailed supplementary materials are openly available, including further analyses, data sets, graphics, questionnaires, scales, and R scripts used, to enable easy replications of all analyses performed in the studies. Several of the studies were pre-registered, and Chapter 4 contains a registered report.

Overview of the Chapters

Chapter 2 consisted of three online studies in which we investigated with hypothetical scenarios which, if any, nudges people expect to harm autonomy. These expectations might turn out to be different from what people actually experience after being nudged, but they might prove a good first indication of what kinds of nudges future research should focus on; more importantly, they have merit on their own. Nudges are controversial (Schmidt & Engelen, 2020), and the concerns laypeople may have are to be found in their *expectations*, not in their *experiences*. We used scenarios from earlier studies (Steffel, et al., 2016) and presented participants with a default nudge, a social norm nudge, direct persuasion, and a control condition with no persuasion in order to investigate how participants rated expected impact on their experience of autonomy, as well as satisfaction, competence, and pressure.

Chapter 3 also consisted of three online studies, the aim of which was to investigate how people feel after being nudged and how that compares to expectations. For this purpose, participants were asked whether they would voluntarily participate in a five-minute longer version of the current study, without receiving additional payment. In the default nudge condition, the affirmative answer was pre-selected; in the social norm nudge condition, participants read a short note informing the participant that most of the other participants chose the affirmative answer; and in the control condition, the question was presented neutrally. We either presented this nudge as a hypothetical scenario or directly confronted participants with the nudge. The hypothetical and actual nudge conditions were thus comparable, which means differences in autonomy could be attributed to this factor.

Chapter 4 was a registered report and consisted of a single study. It further investigated the impact of transparency by comparing the same non-transparent default nudge of Chapter 3 with two transparent variations. The nudge was made transparent by either explaining the purpose of the nudge, or—in addition to its purpose—explaining that most people are unaware of the nudge.

Finally, **Chapter 5** consisted of a single study in which we tested whether the effect of nudges on autonomy would be stronger if the decision that is nudged is more relevant and important to the participant. To that end, we asked Dutch participants about their experienced autonomy in their decision about being an organ donor. The Dutch organ donation law was in the process of being changed, so that citizens would automatically be registered as a donor if they did not explicitly register otherwise. To promote active registration before the default choice would be applied, every unregistered citizen received a letter urging them to make an active decision; only in cases where citizens did not do so before the six-week deadline would citizens default to becoming an organ donor. Participants were asked whether they were already registered before the law came into effect or whether they registered after they

received the letter. After that, participants indicated how autonomous they felt about their choice. We could thus compare the experienced autonomy of participants who actively registered their choice without any prompt (before the law came into effect) to, for example, participants who did not make an active choice and became donors by default. The results showed that autonomy was high for people who registered without a prompt, as well as for participants who registered after being prompted. However, participants who did not actively register experienced significantly less autonomy. We thus conclude that making one's own choice has much more influence on experienced autonomy than being prompted.

Together these empirical chapters aim to provide insight into what might potentially be one of the biggest downsides of nudges, namely their effect on *experienced* autonomy.

Chapter 2

And How Would That Make You Feel?

How People Expect Nudges to Influence Their Sense of Autonomy

This chapter is based on:

Wachner J, Adriaanse M.A., & De Ridder D.T.D. (2020). And How Would That Make You Feel? How People Expect Nudges to Influence Their Sense of Autonomy. *Frontiers in Psychology, 11*, Article 607894. doi: 10.3389/fpsyg.2020.607894

The data collected for this chapter is available at:

https://osf.io/6nvka/?view_only=ab104a8541864d89b29341263973a0e8

Acknowledgement of author contributions:

JW, MA, and DR contributed to the conception and design of the study. JW programmed the studies, performed the data analyses, and wrote a first draft of the manuscript. MA and DR provided suggestions for improvement.

Abstract

Objective: While nudges are increasingly utilized in public policy settings, their potential threat to autonomous choice is the topic of heated debate. Regardless of the actual effects of nudges on autonomy, the mere perception of nudges as autonomy threatening by the general public or policy makers could negatively influence nudge acceptability. The present online studies examined how people expect (different) nudges to affect their perception of autonomy.

Methods: In the first study (N = 455), participants were presented with a hypothetical choice that employed either a default nudge, direct persuasion, or no persuasion, to steer to the desired choice. The presented influence technique was explained before participants reported their expected autonomy, as well as their expected choice satisfaction. Study 2 (N = 601) involved a replication of Study 1 with an additional social norm nudge condition. In Study 3 (N = 750), the explanation of how choice had been influenced was omitted.

Results: While participants expected the default nudge to violate autonomy (Study 1), they had no such expectations for social norm nudges (Study 2). Omitting the explanation that most people are unaware of nudges influencing their choice, reduced the negative impact of nudges on expected autonomy (Study 3).

Conclusion: Effects of nudges on expectations of autonomy differ by type of nudge. Negative expectations are primarily driven by the explanation that decision makers are often unaware of nudges.

In the past decade, nudging, generally defined as the promotion of one choice without forbidding any options or significantly changing their economic incentives (Thaler and Sunstein, 2008), has found its way into public policy applications. Nudging effectiveness has been demonstrated in a variety of domains, including dietary behavior (Arno and Thomas, 2016), saving behavior (Thaler and Benartzi, 2004), recycling (Milford, Øvrum, & Helgesen, 2015), and many others (Benartzi et al., 2017). Despite the evidence in favor of nudges' effectiveness, there are still other aspects of nudges that are critically debated. One key point of debate is nudges' alleged negative impact on the decision maker's autonomy (Bovens, 2009; House of Lords, Science, and Technology Select Committee, 2011; Hansen and Jespersen, 2013). To our knowledge, there is no empirical research done to test this allegation with a specific focus on nudges, which leaves the existence of this impact open to speculation. However, regardless of whether nudges harm autonomy, merely perceiving an attempt to change one's decision as autonomy threatening is shown to be related to negative outcomes such as worse attitude toward the promoted issue (Pavey and Sparks, 2009), lowered autonomous motivation (Pavey and Sparks, 2009), and lowered perceived usefulness of the promoted option (Walter and Lopez, 2008). In the current study, we therefore aim to investigate people's *expectations* of how nudges might influence their perceived autonomy (further referred to as expected autonomy), as well as related constructs. Findings from this study will give insights into how threatening people experience different kinds of nudges to be to their autonomy, decision competence and choice satisfaction, and how changes to their understanding of what a nudge is can alter the severity of the perceived threat.

Autonomy is a fundamental psychological construct that has been most prominently introduced under the realm of self-determination theory (SDT; Ryan and Deci, 2000b). SDT is a highly influential psychological theory that describes three basic and universal human needs: autonomy, competence, and relatedness (Ryan and Deci, 2017). SDT posits that a

person's well-being and personal growth are dependent on the satisfaction of these three needs. This assumption has received ample empirical support, as many studies have indeed shown that satisfaction of these needs lead to positive well-being outcomes (e.g., Van den Broeck et al., 2016) and that need dissatisfaction conversely leads to negative wellbeing outcomes (e.g., Wei et al., 2005). Critical in relation to nudging, SDT also claims that autonomy is not only a determinant of well-being, but also crucial to one's self-regulation. Specifically, according to SDT "developing a sense of autonomy and competence is critical to the processes of internalization and integration, through which a person comes to self-regulate and sustain behaviors conducive to health and well-being" (Ryan, Patrick, Deci, & Williams, 2008; p. 2).

Nudges are interventions designed to steer people's behavior in a particular direction while preserving their freedom of choice. To achieve this objective, nudges typically make strategic use of heuristics that steer our behavior. These so-called simple "rules of thumb" guide people's behavior without individuals being immediately aware of responding to these heuristics. For example, a study that employed the salience heuristic by rearranging the products in a kiosk (placing the fruit at the cash register, a place where clients tend to make impulsive purchases) was effective in encouraging the purchase of healthy foods (Kroese et al., 2015).

Whereas nudges may be quite promising in applying heuristics to effectively and efficiently promote desired behaviors across behavioral domains (Benartzi et al., 2017), the use of nudges also implies that behavioral choices are to some extent steered by contextual features and that individuals may not be fully aware of this. It is these undetected contextual features that, according to philosopher Bovens, undermine the decision maker's autonomy, as the decision maker would possibly not want these features to influence their decision (Bovens, 2009). We argue that people especially expect a nudge to be harmful to autonomy

when the nudge would make them unaware of certain factors and these factors' influence on their decision.

People might have the expectation that nudges harm one's autonomy, as an explanation of nudges generally involves that one will be subjected to subtle manipulations involving processes into which one may lack introspection, which could cause individuals to expect that this should harm their autonomy. While there have been no empirical studies on the effects of nudging on autonomy, it is evident that before doing so, a clear definition of autonomy is needed. Vugts and colleagues (2020) have distinguished three concepts of autonomy that have been used in the nudging literature: freedom of choice, agency, and self-constitution (Vugts, Van Den Hoven, De Vet, & Verwilt, 2020). In the current paper we will focus on autonomy as self-constitution or being able to realize one's personal goals and aspirations, as it puts emphasis on the person's individuality and authenticity, and thereby taps into the aforementioned ethical concerns.

Note that people's expectations of their sense of autonomy should not be seen as a proxy for people's sense of autonomy had they actually been nudged, but rather as its own concept of interest. Since people are often unaware of nudges, they likely fail to reconsider their expectations of nudges once they were nudged and did not feel less autonomous, as they were not aware of being nudged in the first place. We argue that expectations, maybe more so than how participants will actually feel about their autonomy, will play an important role in people's acceptance and judgment of nudges used in public policy. Additionally, people's actual autonomy is again different to their sense of autonomy, however, it is not our intent to investigate or predict actual autonomy. Only people's expectations for their sense of autonomy will be investigated.

The Present Studies

The present study will examine whether people expect nudges to impose a threat to autonomy. We will investigate how exposure to nudges affects the subsequent expected experience of autonomy, how this in turn affects choice satisfaction, and to what degree a decreased sense of autonomy upon being nudged may be the result of an explanation of how nudges operate. Rather than manipulating actual behavior through nudges, we will use a scenario in which participants are exposed to a *hypothetical* nudge and instructed to estimate how the nudge would affect autonomy. The use of hypothetical scenarios to measure participants reaction to nudges has been employed previously (Schroeder, Waytz, & Epley, 2017), and has merit on its own, as it shows how people think of nudges and influences nudge acceptance. Every hypothetical nudge scenario will be presented together with an explanation of what a nudge is. This will ensure that people can make up their mind on nudges while having a basic understanding of how they work, similar to how people would debate nudges were they broadly implemented by public policies. We also specifically opted to not let participants make a decision in the scenario, in order to lower the risk of the occurrence of egocentric biases like the optimistic bias, which is the tendency to think one's own risk is less than the risk of their peers (Klein and Helweg-Larsen, 2002).

In Study 1, participants were exposed to a default nudge, a direct persuasion message, or a control condition without any attempt whatsoever to influence choice. We included a direct persuasion condition to examine the effect of nudges as compared to other interventions aimed at steering a choice. We use Simons' definition of persuasion, stating that persuasion is "human communication designed to influence the autonomous judgements and actions of others" (Simons, 2001). "Direct" in this context means that the persuasion is designed in a way that the decision maker is aware of it. Participants were asked to indicate how much pressure they experienced to comply with the promoted choice, and how much

autonomy and choice satisfaction they would expect to experience. We hypothesize that participants in the control condition will experience the highest expected autonomy, highest expected satisfaction and lowest experienced pressure, whereas participants in the direct persuasion condition will experience the lowest on these outcomes and participants in the default nudge condition will report scores in between. We also hypothesize that pressure mediates the effect of condition on autonomy, and autonomy mediates the effect of condition on satisfaction.

In Study 2, we aimed to replicate and extend the effects from Study 1 by adding a second type of nudge (social proof) to test whether the effects of a default nudge generalize to other types of nudges. In Study 3, we made small alterations to the explanation of how nudges operate to explore the degree to which the various aspects of the description may account for the effects found in Study 1.

Study 1

Materials and Methods

Sample Size Estimation and Participants

For this study, an *a priori* power analysis (G*Power; Faul, Erdfelder, Buchner, & Lang, 2009) revealed a required sample size of $N = 342$ to achieve statistical power of 0.80 to detect an effect size of ($\eta^2 = .027$). This expected effect size is based on the effect size found for the difference in autonomy in an unpublished study [$N = 140$, Wachner, Adriaanse, De Ridder, unpublished data] in which we used the same autonomy scale as in the current paper. Given that the pilot study was only somewhat similar to the current studies and that we wanted to have a well powered study which can reliably find smaller effects, we finally decided to increase the recommended sample size by 100, which equals 150 participants per

condition, to be sure not to end up with an underpowered study. We recruited 455 participants [61% female, mean age 37 ($SD = 12.67$; range 18–73)] through the online service Prolific. Participation was rewarded with 0.50€.

Design and Procedure

The present study used a one-factor between-subject design, with type of persuasion (default nudge/direct persuasion/control) as the independent variable and pressure, expected autonomy, and expected satisfaction as the main dependent variables. Participants were first told that the survey would take approximately 5 min, that they could stop participating at any time, and that their data will be anonymous and handled with care. Then, participants were presented with a scenario (Steffel et al., 2016), requiring them to imagine that they had just moved and were given the opportunity to rent “green” amenities that could reduce their electricity consumption. Next, they were presented with the list of amenities. The way of presentation varied by condition. Participants were asked to imagine themselves making a decision in this scenario.

The displayed persuasion technique was explained on the following page of the online survey. After reading the explanation, participants were asked to answer questions about their regarding pressure and their expectations for autonomy and satisfaction with their choice. Participants then had to answer an attention check, where they had to recollect what was special about the presentation of the list of amenities. Finally, we asked for demographics, asked a few explorative questions, thanked the participant, and provided the researcher’s email address in case participants had questions or remarks.

Scenario and Persuasion

An adjusted scenario was taken from a study by Steffel et al. (2016). All participants were asked to read the scenario carefully and imagine themselves in the scenario. The adjusted scenario read: “You are moving into a new apartment. You are offered some ‘green’

amenities that will each add between 2 and 10\$ to your monthly rent. You can see the form from which to choose the amenities, on the next page.” On the next page, a list of 14 amenities was shown (see Supplementary Materials). In the default nudge condition, all amenities were selected by default. In the direct persuasion condition, the sentence “Please think of the environment and select as many amenities as possible!” was added. In the control condition no sentence was added and no amenities were pre-selected. Participants were not actually able to choose any amenities. After 20 seconds they were able to proceed to the next page. On the next page, the persuasion technique was named and explained (see Appendix A).

Expected Autonomy

Participants’ expected autonomy was assessed by the autonomy subscale of the Basic Psychological Needs in Exercise Scale (BPNES; Vlachopoulos and Michailidou, 2006), which in its original form measures autonomy in a physical exercise context, but was adjusted for this paper to assess autonomy in a decision making context (see Appendix B). It comprises four statements (e.g., “I feel that my choice is definitely an expression of myself.”), which participants rated on a five-point scale (“strongly disagree”—“strongly agree”). The four scores were averaged to one expected autonomy score with a good reliability (Cronbach’s $\alpha = 0.89$).

Pressure

Pressure was measured with one single question (“How much pressure have you felt to agree to most or all green amenities?”). Participants responded on a slider with labels on the both extremes (“None at all”—“Extreme Pressure”) and the scores ranged from zero to a hundred.

Expected Satisfaction

Participants' expected satisfaction with their choice was measured with the Decision Regret Scale (Brehaut et al., 2003)¹, consisting of six statements (e.g., "It was the right decision") which participants rated on a five-point scale ("strongly disagree"— "strongly agree"; see Appendix B). The six scores were averaged to one expected satisfaction score with a good reliability (Cronbach's $\alpha = 0.84$).

Attention Check

The attention check was one question that asked "what was special about the presentation of the list?" and participants had to choose the right answer out of five options. A total of 75 out of the 455 participants failed the attention check. Omitting participants who failed the attention check did not change any of the main effects. We therefore report on analyses that do include participants who failed the attention check.

Demographics

Finally, we asked for gender (male, female, other). As only two people answered "other," we will omit this category from further analyses. Participants also provided their age, and answered on a slider how clear the study was to them, ranging from "I did not understand what I was supposed to do" to "Everything was clear to me."

Additional Measures

We also measured expected decision making confidence with six statements, the importance of living sustainably with one question, how much they liked the persuasion technique used with one question, as well as how likely participants themselves, or others, are

¹ We decided to use this scale as it is formulated in such a broad way that it can be used in our study. Even though there are questionnaires which aim to specifically measure satisfaction, these questionnaires are specifically tailored to shared decision making in medical settings (Satisfaction With Decision scale; Wills and Holmes-Rovner, 2003) or decisions that will impact behavior for long periods of time (Sainfort and Booske, 2000). The Decision Regret Scale was found to be strongly negatively correlated with the Satisfaction With Decision scale (Brehaut et al., 2003) and will be used in our study as a mirrored proxy for satisfaction with one's choice.

to be influenced by the persuasion technique they had been exposed to, with one question each. These measures will not be further discussed in this paper, but their full descriptions can be found in the Supplementary Materials.

Results

Randomization Check

A logistic regression analysis was performed with condition as the independent variable and age, and gender as dependent variables. The results showed that participants were successfully randomized across conditions (all $ps > 0.68$).

Descriptives and Correlation Table

Descriptives and correlations of the main variables can be found in Table 2.1. Participants on average reported relatively high levels of autonomy ($M = 3.71$, $SD = 0.87$) and satisfaction ($M = 3.93$, $SD = 0.70$), which were strongly correlated ($r = 0.63$, $p < .001$). Additionally, pressure was negatively correlated with both autonomy and satisfaction ($r = -.24$, $p < .001$; $r = -0.29$, $p < .001$).

Autonomy

A one-way ANOVA with condition as the independent variable and autonomy as the dependent variable revealed a significant difference of medium strength between conditions, $F(2, 452) = 20.1$, $p < .001$, $\eta^2 = .08$ (see Figure 2.1). Post-hoc comparisons using the Tukey HSD test support part of our hypothesis, as the mean expected autonomy score for the default nudge condition ($M = 3.36$, $SD = 1.08$) was significantly lower than the mean score for the direct persuasion condition ($M = 3.89$, $SD = 0.74$, $p < .001$) and the control condition ($M = 3.89$, $SD = 0.64$, $p < .001$). Contrary to our hypothesis, the direct persuasion condition did not score lower than the control condition ($p = 0.999$)².

² Autonomy, competence and satisfaction are not normally distributed. Following Tabachnick and Fidell (2007), 20 or more degrees of freedom are necessary if the data is not normally distributed. Due to the high number

Table 2.1

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3
1. Pressure	36.89	29.90			
2. Age	37.27	12.67	-.04 [-.13, .05]		
3. Autonomy	3.71	0.87	-.24** [-.33, -.16]	.13** [.04, .22]	
4. Satisfaction	3.93	0.70	-.29** [-.37, -.20]	.09* [.00, .18]	.63** [.57, .68]

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 $p < .01$.

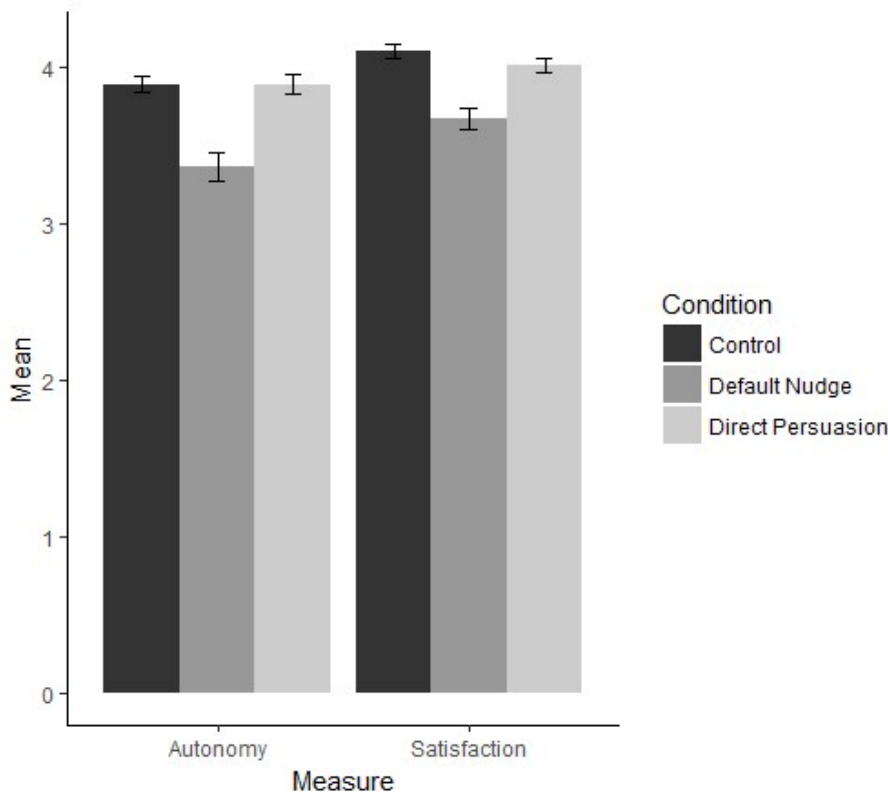


Figure 2.1. Autonomy, Competence, and Satisfaction per condition (Study 1).

of participants, this is given for all our analyses. The same variables also have heteroscedasticity of variance. Here, Tabachnik, and Fidell argue that an alpha of .025 or .01 should be used, which does mean that the effect for autonomy, competence, and satisfaction are still significant.

Pressure

A one-way ANOVA with condition as the independent variable and pressure as the dependent variable revealed a significant difference of medium strength $F(2, 452) = 34.8, p < .001, \eta^2 = .13$. Post-hoc comparisons using the Tukey HSD test support our hypothesis, as the mean pressure score for the default nudge condition ($M = 49.84, SD = 31.20$) was significantly higher than the mean score for the direct persuasion condition ($M = 37.58, SD = 28.19, p < .001$), followed by the control condition ($M = 23.27, SD = 23.83, p < .001$).

Satisfaction

A one-way ANOVA with condition as the independent variable and satisfaction as the dependent variable revealed a significant difference of medium strength $F(2, 452) = 17.7, p < .001, \eta^2 = .07$ (see Figure 2.1). Post-hoc comparisons using the Tukey HSD test support part of our hypothesis, as the mean satisfaction score for the default nudge condition ($M = 3.67, SD = 0.84$) was significantly lower than the mean score for the direct persuasion condition ($M = 4.01, SD = 0.61, p < .001$) and the control condition ($M = 4.10, SD = 0.54, p < .001$). Contrary to our hypothesis, the direct persuasion and control condition did not differ significantly ($p = .458$).

Finally, we tested for serial moderation of pressure and autonomy for the effect of the nudge on expected satisfaction (further mediation models can be found in the Supplementary Materials). In comparison to the control condition, the default nudge had a significant negative effect on expected satisfaction [$b = -0.44, t(304) = -5.4, p < .001$]. As theorized, this effect was serially mediated by pressure and expected autonomy. The indirect pathway of the effect of the nudge on expected satisfaction via pressure and expected autonomy was significant [$b(\text{indirect}) = -0.06, z = -2.5, p = .011$]. This pathway fully accounted for the overall impact of the nudge on expected satisfaction with the direct effect being insignificant [$b(\text{direct}) = -0.09, z = -1.3, p = .183$].

Discussion

Study 1 found that participants who were exposed to a default nudge in a fictitious scenario experienced more pressure, and expected to experience less autonomy and less choice satisfaction as compared to the control and persuasion conditions. However, it is unclear whether these effects are specific to default nudges or generalize to other types of nudges. Additionally, in Study 1 the default nudge by default selected 14 options, which contrasts with common default nudges that pre-select one option over one or a few alternatives (e.g., preselection of a green energy provider over a gray energy provider). Therefore, we will replicate Study 1 with a new hypothetical scenario comprising less preselected options. We will also include a second type of nudge in the design.

Study 2

Materials and Methods

Participants

As in Study 1, we again recruited 150 participants per condition, resulting in 601 participants [59% female, mean age 36 ($SD = 11.32$; range 18–78)]. Participation was rewarded with 0.70€.

Design and Procedure

Study 2 was designed as a conceptual replication and extension of Study 1, comprising a between-subjects design, with type of persuasion as the main independent factor (default nudge/direct persuasion/social norm nudge/control). The dependent variables were the same as in Study 1.

A few changes were made to the design: First, we added a social norm nudge condition, where participants were nudged with a description highlighting the popularity of a

particular choice with the other participants. As default nudges are generally considered to exert the strongest influence on choices (Sunstein, 2016), we included a milder type of nudges to examine whether we can replicate the findings from Study 1.

Second, we implemented a more realistic scenario, where only one option could be selected. The new scenario asked participants whether they wanted 100% conventional electricity, or a mix which includes 50% green electricity at a higher price. In the default nudge condition we checked the green option by default. In the social norm nudge condition we added a sentence which stated that most tenants chose the green option. In the direct persuasion condition we added a sentence that urged participants to choose the green option. The control condition did not include any type of persuasion. Again, the used persuasion technique was explained and named to participants.

Results

Randomization Check

A logistic regression was performed with condition as independent variable and age and gender as dependent variables. The results showed that participants were successfully randomized (all $ps > 0.35$).

Descriptives

Participants on average reported relatively high levels of autonomy ($M = 3.66$, $SD = 0.87$) and satisfaction ($M = 3.97$, $SD = 0.73$), which were strongly correlated ($r = 0.64$, $p < .001$). Similar to Study 1, pressure was negatively correlated with both autonomy and satisfaction ($r = -.28$, $p < .001$; $r = -.42$, $p < .001$).

Autonomy

A one-way ANOVA with condition as the independent variable and autonomy as the dependent variable revealed a significant difference of medium strength $F(3, 597) = 12.7$, $p <$

.001, $\eta^2 = .06$ (see Figure 2.2). Post-hoc comparisons using the Tukey HSD test support part of our hypothesis, as the mean autonomy score for the default nudge condition ($M = 3.31$, $SD = 1.02$) was significantly lower than the mean score for the direct persuasion condition ($M = 3.74$, $SD = 0.74$, $p < .001$), the social norm nudge condition ($M = 3.88$, $SD = 0.74$, $p < .001$), and the control condition ($M = 3.72$, $SD = 0.84$, $p < .001$). The direct persuasion, social norm nudge, and control condition did not differ significantly (all $ps > .31$).

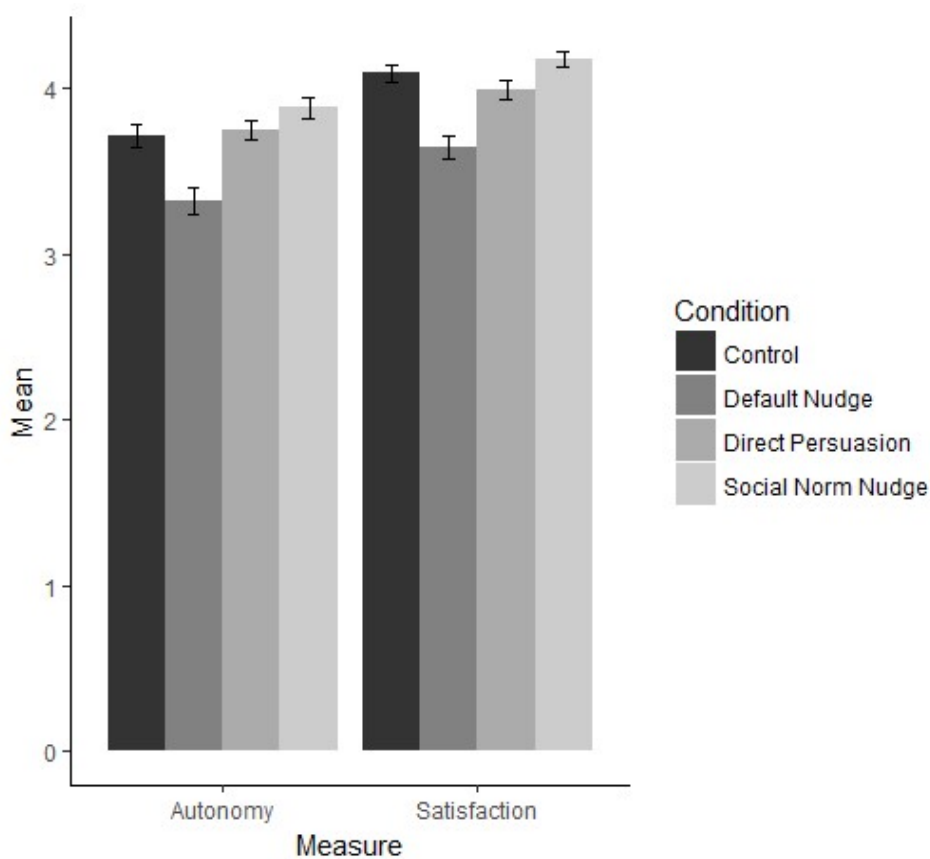


Figure 2.2. Autonomy, Competence, and Satisfaction per condition (Study 2).

Pressure

A one-way ANOVA with condition as the independent variable and pressure as the dependent variable revealed a significant difference of medium strength $F(3, 597) = 14.3$, $p < .001$, $\eta^2 = .07$. Post-hoc comparisons using the Tukey HSD test support part of our hypothesis, as the mean pressure score for the default nudge condition ($M = 47.80$, $SD = 32.39$) was significantly higher than the mean score for the control condition ($M = 27.14$, SD

= 24.87, $p < .001$) and the social norm nudge condition ($M = 35.27$, $SD = 29.36$, $p = .002$).

Contrary to our hypothesis, the direct persuasion condition ($M = 44.52$, $SD = 30.69$) did not differ from the default nudge condition ($p = .787$). Yet, in line with our hypothesis, the social norm nudge condition scored also significantly lower than the direct persuasion condition ($p = .044$). Finally, the social norm nudge condition scored marginally lower on pressure compared to the control condition ($p = .093$), while the direct persuasion condition and control condition did not differ ($p = .787$).

Satisfaction

A one-way ANOVA with condition as the independent variable and satisfaction as the dependent variable revealed a significant difference of medium strength $F(3, 597) = 16.6$, $p < .001$, $\eta^2 = .08$ (see Figure 2.2). Post-hoc comparisons using the Tukey HSD test support part of our hypothesis, as the mean satisfaction score for the default nudge condition ($M = 3.64$, $SD = 0.88$) was significantly lower than the mean score for the direct persuasion condition ($M = 3.99$, $SD = 0.68$, $p < .001$), the social norm nudge condition ($M = 4.17$, $SD = 0.58$, $p < .001$) and the control condition ($M = 4.09$, $SD = 0.66$, $p < .001$). Contrary to our hypothesis, the direct persuasion and control condition did not differ significantly ($p = .638$). The direct persuasion and social norm nudge condition did not differ either ($p = .124$).

Finally, we tested for serial moderation of pressure and autonomy for the effect of the nudge on expected satisfaction (further mediation models can be found in Supplementary Materials). Compared to the control condition, the default nudge condition had a significant negative effect on expected satisfaction [$b = -0.45$, $t(301) = -5.1$, $p < .001$]. This effect was partially mediated by pressure and expected autonomy. The indirect pathway of the effect of the nudge on expected satisfaction via pressure and expected autonomy was significant [$b(\text{indirect}) = -0.09$, $z = -3.7$, $p < .001$]. This pathway partially accounted for the overall

impact of the nudge on expected satisfaction, with the direct effect being smaller, however, still significant [b (direct) = -0.16 , $z = -2.2$, $p = .025$].

Discussion

Study 2 replicated the findings for the default nudge within a new decision scenario using a more conventional default nudge, comprising a lower number of preselected options. Study 2 also aimed to test whether the effects of default nudges found in Study 1 extended to other types of nudges. Findings indicate that participants did not consider the social norm nudge as autonomy threatening and even less so than the direct persuasion message, supporting the idea that different kinds of nudges differ in how autonomy threatening they appear. Study 3 was designed to test whether this difference between the social proof and default nudge could be replicated. We examined the extent to which the descriptions of the nudges being used were driving experienced pressure, and the expectations of autonomy and satisfaction, to disentangle nudge exposure from nudge explanation. We therefore included a condition in which the explanation, that nudges are mostly unnoticed by the decision maker, was omitted.

Study 3

Materials and Methods

Participants

Similar to Study 1 and Study 2, we tested 150 participants per condition, resulting in 750 participants [60% female, mean age 34 ($SD = 12.01$; range 18–81)]. Participation was rewarded with 0.50€

Design and Procedure

The study was similar to Study 2 in terms of the general procedure but involved different experimental conditions. Study 3 included one control condition and four experimental conditions. The experimental conditions involved either a default or a social norm nudge, and either nudge was followed by a description highlighting its goal, its working mechanism, and its name (“nudge”). The description either included or omitted the statement that most nudges are not noticed by the decision maker. The control condition was similar to control conditions in Study 1 and Study 2.

Results

Randomization Check

A logistic regression was performed with conditions as independent variable and age and gender as dependent variables. The results showed that participants were successfully randomized (all $ps > .08$).

Descriptives

Participants on average reported relatively high levels of autonomy ($M = 3.61$, $SD = 0.94$) and satisfaction ($M = 3.91$, $SD = 0.81$), which were strongly correlated ($r = .60$, $p < .001$). Additionally, pressure was negatively correlated with both autonomy and satisfaction ($r = -.30$, $p < .001$; $r = -0.46$, $p < .001$).

Autonomy

A one-way ANOVA with condition as the independent variable and autonomy as the dependent variable revealed a significant difference of medium strength $F(4, 745) = 14.6$, $p < .001$, $\eta^2 = .07$; see Figure 2.3. Post-hoc comparisons using the Tukey HSD test indicated that compared to the control condition ($M = 3.65$, $SD = 0.93$), the default nudge condition scored significantly lower ($M = 3.22$, $SD = 1.05$, $p < .001$), while the default nudge omission

condition did not score significantly different ($M = 3.48, SD = 0.99, p = .409$). The social norm nudge condition did not score significantly different ($M = 3.79, SD = 0.78, p = .645$) from the control condition and the social norm nudge omission condition even scored significantly higher ($M = 3.94, SD = 0.74, p = .037$) than the control condition.

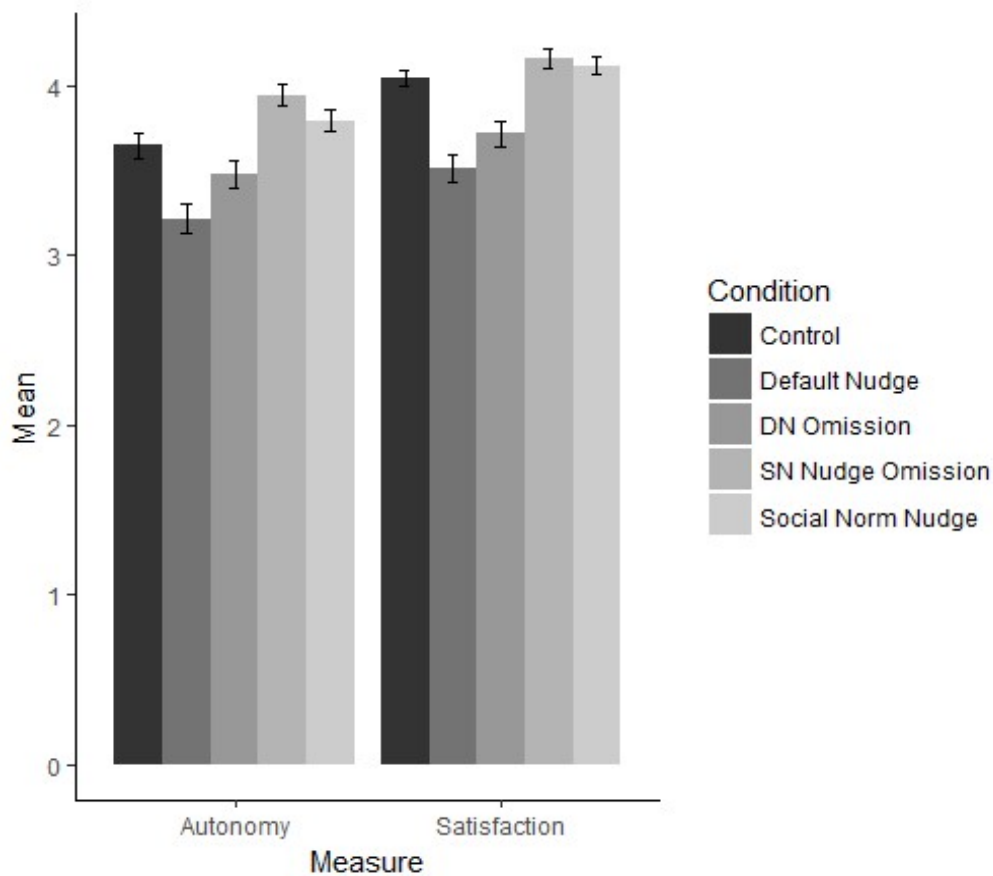


Figure 2.3. Autonomy, Competence, and Satisfaction per condition (Study 3).

The default nudge condition did not score significantly different to the default nudge omission condition ($p = .094$), and the social norm nudge condition did not score significantly different to the social norm nudge omission condition ($p = .582$).

Pressure

A one-way ANOVA with condition as the independent variable and Pressure to take as many amenities as possible as the dependent variable revealed a significant difference of small strength $F(4, 745) = 6.69, p < .001, \eta^2 = .03$. Post-hoc comparisons using the Tukey HSD test indicated that participants in the default nudge condition ($M = 46.82, SD = 33.52$)

scored significantly higher on pressure than participants in the control condition ($M = 35.32$, $SD = 30.30$, $p = .013$), the social norm nudge condition ($M = 34.68$, $SD = 28.94$, $p = .007$) and the social norm nudge omission condition ($M = 32.58$, $SD = 30.18$, $p < .001$, $p < .001$). The default nudge omission condition ($M = 45.16$, $SD = 32.50$), opposed to the default nudge condition, scored only marginally higher on pressure than the control condition ($p = .052$). Still, the default nudge omission condition scored significantly lower than the social norm nudge ($p = .031$) and social norm nudge omission condition ($p = .005$). Contradicting our hypothesis, the omission conditions did not differ significantly from the non-omission conditions ($ps > .977$).

Satisfaction

A one-way ANOVA with condition as the independent variable and choice satisfaction as the dependent variable revealed a significant difference of medium strength $F(4, 745) = 12.0$. $p < .001$, $\eta^2 = .10$; see Figure 2.3. Post-hoc comparisons using the Tukey HSD test indicated that participants in the default nudge condition ($M = 3.51$, $SD = .99$) scored significantly lower on satisfaction as participants in the control condition ($M = 4.04$, $SD = 0.57$, $p < .001$), the social norm nudge condition ($M = 4.12$, $SD = 0.63$, $p < .001$), and the social norm nudge omission condition ($M = 4.16$, $SD = 0.69$, $p < .001$). The default nudge omission condition ($M = 3.72$, $SD = 0.88$) also did score lower on satisfaction compared to the social norm nudge ($p < .001$) and social norm nudge omission condition ($p < .001$). Contradicting our hypothesis, the default nudge condition and the default nudge omission condition did not differ significantly ($p = .142$). Finally, opposed to autonomy, participants in the default nudge omission condition also scored significantly lower on satisfaction compared to the control condition ($p = .003$).

Finally, we tested for serial moderation of both pressure and autonomy for the effect of the default nudge without an explanation on expected satisfaction (further mediation

models can be found in the Supplementary Materials). In comparison to the control condition, the default nudge condition negatively affected expected satisfaction [$b = -0.53$, $t(299) = -5.7$, $p < .001$]. This effect was, however, not mediated by pressure and expected autonomy. The indirect pathway of the effect of the nudge on expected satisfaction via pressure and expected autonomy was significant [$b(\text{indirect}) = -0.02$, $z = -2.2$, $p = .031$]. This pathway partially accounted for the overall impact of the nudge on expected satisfaction [$b(\text{direct}) = -0.27$, $z = -3.6$, $p < .001$].

Discussion

Study 3 replicated the findings of Studies 1 and 2 with regard to the two nudge conditions using the explanation including the section on awareness: they were again seen as more negative in its effect on pressure, autonomy and satisfaction. Moreover, similar to Studies 1 and 2, pressure mediated the effect of condition on autonomy, and autonomy mediated the effect of condition on satisfaction. The social norm nudge condition scored the same as the control condition on the three dependent variables, similar to Study 2. Study 3 also tested whether the effects of the nudges on pressure, autonomy and satisfaction were driven by the description of the nudge. Importantly, omitting the explanation regarding awareness improved expected autonomy to the extent that the default nudge condition was now no longer statistically different to the control group. Omitting the awareness-sentence from the social norm nudge description even resulted in *higher* expected autonomy compared to the control condition, suggesting that people consider some nudges as autonomy supportive.

General Discussion

The goal of the current series of studies was to investigate people's expectations of the effects of nudges on autonomy. This was done with hypothetical nudges that were explained to the participants, so that participants' expectations of autonomy and other measures reflect the expectations and opinions that people have when they discuss nudging, such as in settings where the public policy or interventions are debated (e.g., private discussion, discussion of company policies, political discussion). Additionally, we tested whether experienced pressure mediates the effects of the persuasion techniques on expected autonomy, and whether expected autonomy in turn predicts participants' expected satisfaction with their choice.

First, all three studies show that participants who were confronted with a hypothetical default nudge anticipated lower scores of autonomy and choice satisfaction and reported higher scores of pressure, compared to participants confronted with either direct persuasion, social norm nudges, or no persuasion at all. These predictions by lay people are similar to those of philosophers, who also suspect nudges to negatively affect autonomy (Bovens, 2009; Hansen and Jespersen, 2013).

Second, we consistently found that social norm nudges do not lead to more negative expectations of autonomy, compared to the control and direct persuasion conditions. This suggests that different types of nudges are seen as differently affecting autonomy and effects of one nudge cannot be generalized to all nudges. A possible explanation for the absence of a negative effect of the social norm nudge on expected autonomy might be that it is seen as less intrusive than a default nudge. Also, the fact that other people choose a certain option might be seen as valid persuasion, as especially descriptive norms are generally experienced as an implicit recommendation. Future research should include a wider range of nudges before strong conclusions can be drawn on the impact of nudges on anticipated autonomy. Future

research should also examine in what way perceptions of default nudges differ from social norm nudges and other types of nudges to identify what element of nudges may be harmful to expected autonomy.

Third, in Study 3 we found that participants in the nudge conditions had similar expectations for autonomy and satisfaction compared to the control condition when they were not told that nudges usually work without the decision maker's awareness. However, this omission did not affect participants' experienced pressure. This indicates that the processes by which the knowledge of nudges' covert nature affect pressure and anticipated autonomy are at least partially independent. Moreover, this finding also suggests that transparency about nudging may not necessarily resolve ethical issues about nudging, as an explanation of how nudges operate may increase feelings of worry rather than decrease them. Indeed, it has been pointed out that disclosure is not a panacea for nudge legitimacy (Loewenstein, Sunstein, & Golman, 2014).

Furthermore, we found that effects of persuasion techniques on expected satisfaction can be partially explained by autonomy. This is in line with the literature on autonomy, which has documented that autonomy is a predictor of different kinds of general satisfaction and happiness outcomes (e.g., Finn, 2001; Howell, Chenot, Hill, & Howell, 2011). This finding suggests that when people expect a nudge to harm their feeling of autonomy, this could lead to the expectation to be less satisfied with one's choice—although our studies do not allow for establishing causality. Still, these findings illustrate the relevance of understanding nudges' effect on autonomy, as the association with choice satisfaction will likely influence future choices. This is important for understanding the long-term effectiveness of nudging interventions.

Additionally, the data confirmed our hypothesis that experienced pressure partially explains the relation between a persuasion technique and expected autonomy. This suggests that

participants who experience more pressure expect to experience less autonomy. This relation between pressure and autonomy is in line with previous research, where it was found that controlling environments, as opposed to supporting environments, are harmful to autonomy and well-being (Gagne, 2003; Adie, Duda, & Ntoumanis, 2012). Again, it has to be noted that we cannot make claims of causality. Still, as our studies showed that it depends on the type of nudge how much pressure people will experience, we demonstrated that a careful selection of a nudge may lead to stronger feelings of autonomy, which in turn could result in a higher satisfaction with one's choice.

The current set of studies showed that, some nudges are expected to have a negative effect on autonomy. However, both the type of nudge and the understanding of what a nudge is, are crucial to this impact. Future research should investigate what aspects of a nudge and people's understanding of a nudge makes them appear threatening to autonomy, in order to design nudges that are not only as effective as possible, but also as nonthreatening as possible.

Appendix A

Descriptions of the manipulations

Description of the default nudge: “As you may have noticed, all boxes are checked by default. This is done to increase the number of amenities that will be chosen. By having all the boxes ticked by default, people will deselect the options they definitely do not want but keep options they are uncertain about selected. Also, having all the boxes ticked by default will give the impression that it is normal to select many amenities. This technique is called Nudging. It is most often used without the decision maker being aware of it.”

Description of the direct persuasion: “As you may have noticed, above the list was a message that said 'Please think of the environment and select as many amenities as possible!'. This is done to increase the number of amenities that will be chosen. By directly talking to the people and reminding them of the environment, more boxes will be selected. This technique is called direct persuasion.”

Description of the control condition: “As you may have noticed, the options were presented in an unbiased manner. This is done so the way in which the form is presented does not influence your decision.”

Appendix B

Expected autonomy and satisfaction questionnaires

Please indicate how you would feel about your choice, had you made a decision under the earlier described circumstances

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
My choice is highly compatible with my goals and interests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel very strongly that my choice perfectly fits my taste.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that my choice is definitely an expression of myself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel very strongly that I had the opportunity to have influence on my choice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Figure 2.B1. Expected autonomy questionnaire.

Please indicate how you would feel about your choice, had you made a decision under the earlier described circumstances

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
It was the right decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I regret the choice that I made.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would go for the same choice if I had to do it over again.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The choice did me a lot of harm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The decision was a wise one.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Figure 2.B2. Expected satisfaction questionnaire. Question two and four are reversed.

Chapter 3

The Influence of Nudge Transparency on the Experience of Autonomy

This chapter is based on:

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The data collected for this chapter is available at:

https://osf.io/bd5tz/?view_only=321d4dc05c734174937e54254f8b9348

Acknowledgement of author contributions:

JW, MA, and DR contributed to the conception and design of the study. JW programmed the studies, performed the data analyses, and wrote a first draft of the manuscript. MA and DR provided suggestions for improvement.

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 investigate whether two variations of transparency will 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.

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, Cawley, Baker-Goering, & Yokum, 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 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., Paunov et al., 2019; Bruns et al., 2018; Kroese et al., 2015). 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* (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 (Hansen & Jespersen, 2013; Bovens, 2009).

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 non-transparent 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 (Kroese, et al., 2015; Loewenstein et al., 2015; Bruns et al., 2018; Steffel et al., 2016), with one study suggesting that transparency may even increase nudge effectiveness (Paunov et al., 2019). 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 non-transparent 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 place³.

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

³ 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.

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, Adriaanse, & de Ridder, 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 (Wachner 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 non-transparent 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 (Wachner et al.,

2021). 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 non-transparent 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 (Bruns et al., 2018; Loewenstein et al., 2015; Kroese et al., 2015; Steffel et al., 2016; Bang, Shu, & Weber, 2018; Paunov et al., 2019). (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 900 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 (non-transparent/purpose/ unawareness & 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 non-transparent 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 & 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. Afterwards, 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 pre-selecting 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 (Wachner et al., 2021).

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 & 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 (Wachner 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 will be 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 & 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 $d = 0.3$, 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 Development Core Team, 2008). 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 attention check. However, should more than 5% of the participants fail the attention check, we will also run the tests below *including* participants that failed the attention check. We will then report all instances where including these participants changed a result from significant to non-significant and vice versa.

Nudge Effectiveness

To test whether the nudges varied in their effectiveness between the conditions, we use logistic regression. We create three dummy variables, one for each condition, which indicate whether participants are in a specific condition or not. We then first run a logistic regression with participants' choice on the nudged questions as the dependent variable, and the purpose dummy variable, as well as unawareness & purpose dummy variable, as the independent variables, in order to compare them to the control condition. Afterwards, we run 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 & purpose condition becomes 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 will, for each of these dependent variables, conduct an ANOVA with the condition as the independent variable. Should an ANOVA show that the three conditions are significantly different, we will conduct 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 will run analyses similar to the nudge effectiveness analyses. We will first run a logistic regression with notification sign up status as the dependent variable, and the purpose dummy variable, as well as unawareness & purpose dummy variable, as the independent variables. Afterwards, we will run 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 find as described above, that the conditions differ in their sign-up ratio, we want to investigate whether this difference is mediated by experienced autonomy. As our study might be 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 & 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 $ps \geq .147$).

Table 3.1 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 & unaware condition (51.9%) did not differ significantly from each other with regard to how often the nudged option was chosen (all $ps \geq .084$). These results are in line with our first hypothesis that the three conditions do not differ in terms of effectiveness of the nudge.

Table 3.1

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	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** [-.22, -.07]	-.32** [-.38, -.24]				
4. choice	0.52	0.50	.20** [.13, .28]	.19** [.11, .26]	-.19** [-.26, -.11]			
5. sign-up list	0.87	0.33	.03 [-.05, .11]	-.03 [-.10, .05]	-.01 [-.09, .07]	.16** [.08, .23]		
6. age	27.14	9.48	.03 [-.05, .10]	.12** [.04, .19]	-.03 [-.10, .05]	.10* [.02, .18]	-.07 [-.15, .01]	
7. sex	1.42	0.50	-.01 [-.09, .07]	.16** [.08, .23]	.07 [-.01, .15]	.03 [-.05, .11]	-.02 [-.10, .05]	.15** [.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 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 & unaware condition to score lower on autonomy and satisfaction and higher for pressure compared to the control condition. We conducted three ANOVAs with 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 & 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 & 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 & 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 & 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 & unaware condition (89.5%) did not differ in their sign-up rate (all $ps \geq .232$). 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 will not conduct a mediation analysis, as was proposed in the analysis plan.

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 $\alpha = .05$. For autonomy, we compared the purpose condition ($M = 5.12$, $SD = 0.68$) and the purpose & unaware condition ($M = 5.24$, $SD = 0.66$) and the equivalence test was non-significant, $t(381.19) = 1.188$, $p = 0.118$,

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 & unaware condition ($M = 5.57$, $SD = 0.91$) and the equivalence test was significant, $t(380.7) = -2.253$, $p = .0124$, 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 & unaware condition ($M = 34.75$, $SD = 29.57$), and the equivalence test was non-significant, $t(384.97) = -1.722$, $p = .0859$, 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 $ps \geq .141$).

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 $ps \geq .448$), 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 & 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 (Kroese, et al., 2015; Loewenstein et al., 2015; Bruns et al., 2018; 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 non-transparent 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 post-nudge 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 non-transparent 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 (Wachner 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, Wheatley, Meyers, Gilbert, & Axson, 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, O'Donoghue, & Rabin, 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 non-existent 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 non-transparent 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 (Kroese, et al., 2015; Loewenstein et al., 2015; Bruns et al., 2018; 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 participant's 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., 2019, Paunov, Wänke, & Vogel, 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 attention checks. However, the failure rate usually is not as high as 30%. The high number of participants who failed to notice 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 manipulation checks and attention 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).

Appendix

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

Chapter 4

The Effect of Nudges on Autonomy in Hypothetical and Real Life Settings

This chapter is based on:

Wachner J, Adriaanse M.A., & De Ridder D.T.D. (2021). The effect of nudges on autonomy in hypothetical and real life settings. *Plos One*, 16(8): e0256124. doi: 10.1371/journal.pone.0256124

The data collected for this chapter is available at:

https://osf.io/bwrmc/?view_only=832463ff0809414ba12c0fb80a6ea68d

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JW, MA, and DR contributed to the conception and design of the study. JW programmed the studies, performed the data analyses, and wrote a first draft of the manuscript. MA and DR provided suggestions for improvement.

Abstract

Nudges have repeatedly been found to be effective, however they are claimed to harm autonomy, and it has been found that laypeople expect this too. To test whether these expectations translate to actual harm to experienced autonomy, three online studies were conducted. The paradigm used in all studies was that participants were asked to voluntarily participate in a longer version of the questionnaire. This was either done in a hypothetical setting, where participants imagined they were asked this question, but did not answer it, and reported their expectations for autonomy; Or in an actual choice setting where participants answered the question and then reported their actual autonomy. The first study utilized the hypothetical setting and tried to replicate that laypeople expect nudges to harm autonomy with the current paradigm. A total of 451 participants were randomly assigned to either a control, a default nudge, or a social norm nudge condition. In the default nudge condition, the affirmative answer was pre-selected, and in the social norm nudge condition it was stated that most people answered affirmative. The results showed a trend for lower expected autonomy in nudge conditions, but did not find significant evidence. In Study 2, with a sample size of 454, the same design was used in an actual choice setting. Only the default nudge was found to be effective, and no difference in autonomy was found. In Study 3, Studies 1 and 2 were replicated. Explanation of the nudge was added as an independent variable and the social norm nudge condition was dropped, resulting in six conditions and 1322 participants. The results showed that participants indeed expected default nudges to harm their autonomy, but only if the nudge was explained. When actually nudged, no effect on autonomy was found, independent of the presence of an explanation.

Nudges are subtle changes in the way options are presented, designed to influence decisions in a predictable way (Thaler & Sunstein, 2008) and achieved by relying on well-known decision-making tendencies. Monetary incentives for a specific option, or making certain options impossible, do not qualify as nudges (Thaler & Sunstein, 2008); by contrast, placing fruit near a cash register to make this nutritional option more salient does count as a nudge. Rather than prohibiting unhealthy choices or making the unhealthy option more expensive, placing the desired option more prominently among less desired options increases customers' focus on the healthy options by making them more easily accessible (Van Gestel, Kroese, & De Ridder, 2018).

Different types of nudges have proven effective across various settings. Placing fruit items next to a cash register at a kiosk increases the number of healthy snacks sold (Kroese et al., 2015). If enrollment in a retirement saving plan is the default option, employee enrollment is significantly higher (Madrian & Shea, 2001), and informing people of how many ecological products the average customer buys does increase the number of such products sold (Demarque, Charalambides, Hilton, & Waroquier, 2015). Besides proving effective, nudges are inexpensive and easy-to-implement interventions that change behaviors and decisions (Benartzi et al., 2017). However, nudges have also been criticized. One prominent criticism is that nudges may harm people's autonomy, as decision makers are unable to protect themselves against the influence of subtle nudges—influence of which they are often unaware (Bovens, 2009; Hansen & Jespersen, 2013). Given autonomy's crucial role for physical and mental well-being (Wei et al., 2005; Van den Broeck et al., 2016), this would be concerning if proved correct. Indeed, a recent study found that participants *expect* nudges to harm their autonomy (Wachner et al., 2020).

In contrast, another study found that scenarios which included a nudge by a health professional were not expected to be harmful to autonomy (Fridman, Hart, Yadav, &

Higgins, 2018). However, in this study participants were not being nudged themselves, but rather asked to rate the scenario from a third person viewpoint. Earlier research has demonstrated that in the case of nudging there is a critical difference in how people evaluate choice support for themselves as compared to choice support for others: they tend to view support for other people as less problematic and even required, while they consider support in making their own decisions as unwanted interference (Schroeder et al., 2017), illustrating that expectations for one's own autonomy are not identical to expectations about other people's autonomy.

Ultimately, the criticism argues that nudges harm the *experience* of autonomy after being nudged, while the beforementioned studies only investigated laypeople's *expected* autonomy. In the current paper, we will argue that these two concepts should be seen as distinct, with each having its own merit. The current paper aims to replicate previous findings regarding *expected* autonomy and investigates *experienced* autonomy in a similar setting. Thereby, we will test the claims outlined above, as well as enhance understanding of the relationship between autonomy expectations and experiences.

Nudges and Autonomy

Whereas several meta-analyses suggest that nudges effectively steer behavior in a desired direction (Broers et al., 2017; Arno & Thomas, 2016; Hummel & Maedche, 2019), opponents of nudges have argued that the use of nudging may thwart people's autonomy. These arguments are rooted in the notion that autonomy is equivalent with conscious free choice upon which people are able to reflect. Although other conceptions of autonomy are being used in philosophical reflection on nudging, such as offering people the chance to act in line with their intentions (see for an overview (Vugts et al., 2020), the most pervasive criticism of nudges potentially harming autonomy relates to the idea that free, unguided choice is crucial to autonomy. The concerns are twofold.

First, philosophers have argued that nudges influence decisions without the decision maker being aware of these influences; this hinders decision makers' opportunity to make an autonomous choice (Bovens, 2009; Hansen & Jespersen, 2013). This concern might be resolved by the use of transparent nudges, i.e., nudges accompanied by an explicit explanation of their purpose and their working mechanism, which have been proven as effective as non-transparent nudges (Bruns et al., 2018; Paunov et al., 2019; Wachner, Adriaanse, De Ridder, 2020b). The second autonomy concern is, however, not resolved by the deployment of transparent nudges. The effectiveness of nudges relies on mechanisms through which nudges influence decisions (e.g., proximity, salience, defaults, anchoring) that are deemed not meaningful, by decision makers themselves, in the process of making decisions. For that reason, Wilkinson (2013) has argued that a decision process is 'perverted' when it is based on factors that the decision maker would normally not see as relevant to their decision.

The Importance of Autonomy in Nudging

Besides the ethical argument for autonomy, there are also psychological and behavioral arguments that speak to the importance of autonomous decisions. Much empirical evidence from the psychological literature illustrates the importance of autonomy for well-being. Self-determination Theory posits that autonomy is a basic need (next to competence and relatedness (Ryan & Deci, 2000). It is an essential predictor of both physical and mental well-being (Wei et al., 2005; Van den Broeck et al., 2016), and this has been empirically demonstrated in diverse settings and across different groups (Sheldon, Ryan, & Reis, 1996; Cordeiro, Paixão, Lens, Lacante, & Sheldon, 2016; Fotiadis, Abdulrahman, & Spyridou, 2019).

Next to its prominent role in health and well-being, autonomy is also important from a psychological perspective because it bears implications for subsequent choices. That is,

research has shown that autonomous choice generally influences whether the decision maker will make a similar decision in the future (Wirtz et al., 2003; Ariely & Norton, 2008).

Considering that nudges are frequently used for guiding repeated decisions, which in and of themselves as isolated choices have little impact (e.g., decisions related to recycling, healthy eating, exercising), negative influences of nudged decisions on subsequent related decisions should be avoided (Van Rookhuijzen, De Vet, & Adriaanse, in press). This further underscores the importance of ensuring that people who follow the nudge also feel autonomous and satisfied after having made a decision, not just for reasons associated with health and well-being in the moment but also to promote similar behavior in the future.

Expectations Versus Reality

Although there clearly are philosophical and psychological reasons to better understand the effect of nudges on post-choice autonomy, few studies have empirically investigated this issue. In an earlier set of studies, we asked participants to read choice scenarios, including descriptions of nudges, and rate how autonomous they expected to feel if they would have made a decision in this scenario (Wachner et al., 2020). We found that people who were presented with a default nudge consistently expected to feel less autonomous compared to people who were not presented with a nudge, while those presented with a social norm nudge expected to feel similarly autonomous compared to a control condition. Studies like these, based on how people expect nudges to impact their autonomy, explain how people think about nudges in a deliberative and general way, as they would during laypeople discussions on nudges.

How people *actually feel* after having been nudged, however, might prove different from how people *expect to feel* after being nudged. A considerable amount of research suggests that people are poor predictors of emotional responses (Dunn et al., 2009; Gilbert & Wilson, 2000), of the likelihood that specific events will occur (Gilbert & Wilson, 2000), and

of their own reactions to future events (Buehler & McFarland, 2001). For example, research on the impact bias suggests that people tend to overestimate the influence of events on their emotions and overall wellbeing (Wilson & Gilbert, 2013). Similarly, research on immune neglect (neglecting one's ability to cope with negative events) demonstrates that people tend to overestimate the impact of negative events (Wilson & Gilbert, 2005). Based on these findings, we hypothesize that although participants may *expect* to feel slightly less autonomous when confronted with a nudge, they do not in fact *feel* less autonomous when nudged.

The Present Research

In the present series of studies, we will investigate and compare people's expectations about the effect of nudges on autonomy and nudges' actual effect on autonomy. In Study 1, we aim to replicate our earlier findings regarding people's expectations of autonomy upon being nudged (Wachner et al., 2020), but we use a new nudge scenario that can also be employed in a subsequent study to investigate the experience of autonomy after actually being nudged. In Study 2, people will actually be nudged, with the nudge from the scenario in Study 1, to investigate how nudges affect experienced autonomy. In Study 3, we replicate Studies 1 and 2 simultaneously to promote an optimal comparison between the effects of nudges in hypothetical and actual nudges settings. Finally, in Study 3 we test the influence of transparency by including conditions where the nudge is made explicit and conditions where the nudge is not made explicit to investigate whether awareness of the nudge impacts autonomy. In addition, we will measure people's satisfaction with their choice as the second primary dependent variable. Secondary dependent measures are decision making competence, experienced pressure to choose the long version of the questionnaire, how carefully participants answered the nudged question, how much participants doubted that the question will actually affect the duration of the study, and how accepting the participants

were of the use of such a nudge. Materials and results for these secondary measures can all be found in the supplementary materials.

Study 1

All studies were approved by the Ethics Committee of the Faculty of Social and Behavioural Sciences of Utrecht University. The approval is based on the documents send by the researchers as requested in the form of the Ethics committee and filed under number 20-150. Written consent was given by participants.

Methods

Participants

We recruited 451 participants (47% female, mean age 30, $SD = 10.48$ [range 18–71]) through the online service Prolific. Participation was rewarded with 0.40£ and took on average five minutes. Prolific users were only eligible to participate if they have not participated in earlier studies of this research line and were fluent in English.

Design and Procedure

This online experiment used a one-factor between-subject design, with type of nudge (default nudge / social norm nudge / none) as the independent variable and expected autonomy and satisfaction as the main dependent variables. Participants were told that they had to read a hypothetical scenario. Depending on the condition they were in, it either included or did not include a nudge. Afterwards, they were asked about their expectations of feelings of autonomy and satisfaction if they would have made a decision in that scenario.

Hypotheses

Based on findings of a previous study (Wachner et al., 2020), we hypothesized participants in the default nudge condition, but not participants in the social norm nudge

condition, to score lower on expected autonomy than participants in the control condition. We expected results for decision satisfaction to be similar to results for autonomy.

Materials

Scenario. Before the actual scenario was presented, participants received a brief explanation and reminders that the question would be hypothetical and that the researchers were not interested in how participants would answer the question, but rather how the participants feel about the question.

Participants were then asked to read the following scenario: “Imagine, you are participating in a short, 5-minute Prolific questionnaire and come across the following question: 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.”. Subsequently, participants were given two options, the ‘Longer Version’ and the ‘Normal Version’. The presentation of this question was slightly altered, depending on the experimental condition (see Experimental Manipulation below).

As this question was programmed as an image rather than as textual information to which participants could respond, it was again emphasized that participants were not required to answer the question. Participants had to wait for 20 seconds before proceeding to the next page to allow ample time for them to read the question. After 20 seconds, an explanation of the influence type was shown on the next page (see Experimental manipulation below), and after another 20 seconds, participants were allowed to proceed to the next part of the questionnaire.

Experimental Manipulation. The presentation of the hypothetical question was slightly different among the three experimental conditions. In the default nudge condition, the option ‘Longer Version’ was checked by default. For the social norm nudge condition, no option was checked by default, but the instruction was followed by a brief note stating, “Most

people chose the longer version.” The control condition had no options checked by default and no note was added.

Influence Explanation. After seeing the hypothetical question, participants were presented with an explanation of the implemented experimental manipulation. Participants saw one of three explanations, depending on the experimental condition. The explanations of the nudge conditions comprised of a description of the nudge (e.g., default nudge: “...one option was already selected...”); the aim of the nudge (“...to increase the chance this option will be chosen.”); the mechanism by which the nudge works (e.g., social norm nudge: “By telling people that other people chose this option, it appears to be the norm...”); and finally, that this technique is called nudging and that people are usually not aware of it. Participants in the control condition read the following explanation: “As you may notice, the options are presented in a neutral manner. This is done so that the way in which the question is presented does not influence your decision.”.

Autonomy questionnaire. Before filling in the autonomy and satisfaction questionnaires, participants were informed that ‘we will ask you about how you think you would have felt, had you actually made a decision in the described scenario’. Participants’ expected autonomy was assessed by the autonomy subscale of the Basic Psychological Needs in Exercise Scale (BPNES; (Vlachopoulos & Michiailidou, 2006), which in its original form measures autonomy in a physical exercise context but was adjusted for this study to assess autonomy in a decision-making context (see Appendix). It comprises four statements (e.g., “I feel that my choice is definitely an expression of myself.”), which participants rated on five-point scales (“strongly disagree” to “strongly agree”). The four scores were averaged into one expected autonomy score (ranging from 1 to 5) with acceptable reliability (Cronbach’s $\alpha = .75$).

Choice satisfaction questionnaire. Participants' expected satisfaction with their choice was measured with the Decision Regret Scale (Brehaut et al., 2003), consisting of five statements (e.g., "It was the right decision."), which participants rated on a five-point scale ("strongly disagree" to "strongly agree"; See Appendix). The five scores were averaged to one satisfaction score with acceptable reliability (Cronbach's $\alpha = .77$).

Results

Descriptives

Participants reported relatively high expectations for autonomy ($M = 3.85$, $SD = 0.67$) and satisfaction ($M = 4.02$, $SD = 0.61$). Autonomy and satisfaction were strongly correlated ($r = .59$, $p < .01$).

Randomization check

We conducted an ANOVA with condition as the independent variable and age as the dependent variable and found that randomization was successful ($p = .620$). We also conducted a Chi-squared test and found that sex was successfully randomized across the conditions ($p = .200$).

Autonomy and Satisfaction

We conducted a MANOVA with autonomy and satisfaction as the dependent variables, and condition as the independent variable. The multivariate effect was significant Wilk's $\Lambda = 0.969$, $F(2, 448) = 3.60$, $p = .007$. Both the effect on autonomy $F(2, 448) = 3.06$, $p = .048$ and satisfaction $F(2, 448) = 6.29$, $p = .002$ were significant.

A subsequent post-hoc Tukey HSD test was conducted for the effect of condition on autonomy, which showed no significant differences between the control ($M = 3.96$, $SD = 0.57$) and the default nudge condition ($M = 3.80$, $SD = 0.73$, $p = .081$) or between the control

and the social norm nudge condition ($M = 3.80$, $SD = 0.71$, $p = .084$). Moreover, no significant difference was found between the default nudge and control condition ($p = 1.00$).

A similar post-hoc Tukey HSD test for satisfaction showed a significant, small difference between the default nudge ($M = 3.90$, $SD = 0.59$) and control condition ($M = 4.14$, $SD = 0.57$, $p = .002$, $d = 0.42$). There were no differences between the default nudge and social norm nudge condition ($M = 4.01$, $SD = 0.63$, $p = .239$) and the control and social norm nudge condition ($p = .132$; See Figure 4.1 for means, standard errors, and significant differences between the conditions on autonomy and satisfaction).

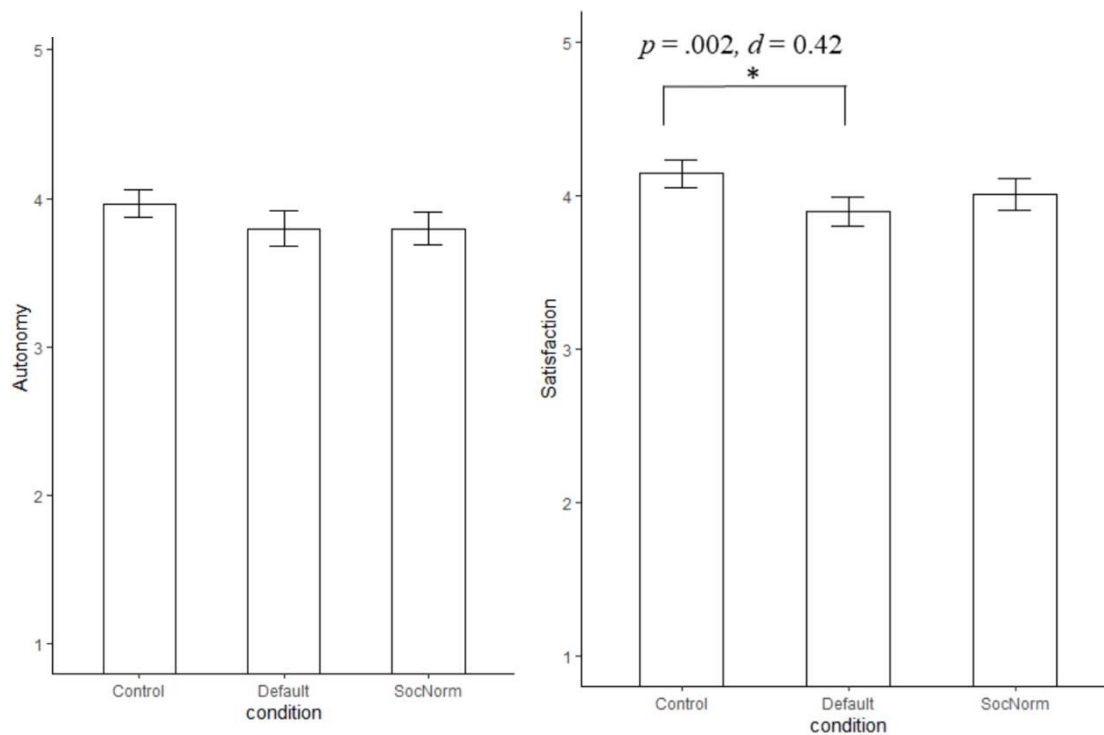


Figure 4.1. Means and standard errors for autonomy and satisfaction.

Discussion

Overall, participants across all three conditions expected to feel quite autonomous and satisfied. Although the means were in the same direction as in our previous study (Wachner et al., 2020), in the present study participants in the nudge conditions did not differ significantly on autonomy compared to the control condition. As hypothesized, participants

who had been exposed to the default nudge, but not participants exposed to the social norm nudge, expected to be less satisfied with their choice compared to the control condition.

One reason why effects on autonomy were smaller in the present study may be the personal relevance of the choice that was nudged. While our earlier studies were about hypothetical choices that involved regular payments of money, the hypothetical choice in the current study was about the investment of an extra five minutes of time. These lowered stakes may be the reason that nudges were not seen as bigger threats to autonomy, although it is unclear to what extent the personal relevance of a free choice determines the severity of reactance (Rosenberg & Siegel, 2018). In Study 2, we will present the same nudges but this time as actual nudges.

Study 2

Method

Participants

We recruited 454 participants (50% female, mean age 29, $SD = 9.58$ [range 18–70]) through the online service Prolific. Participation was rewarded with 0.40£ and the study took an average of five minutes. Prolific users were eligible to participate if they had not participated in earlier studies of the present line of research and were identified as being fluent in English.

Design and Procedure

In contrast to Study 1, participants were asked to actually choose the long or short version of the questionnaire. Following the request, participants were asked how careful they had been in making this choice and whether they believed that their answer would actually change the survey length. Then, participants filled in the autonomy and satisfaction

questionnaires. Afterwards, participants were informed that their answers had not affected the length of the questionnaire and that the aim of the experiment was to investigate the influence of the presentation of a question. Subsequently, they were thanked for their participation.

Hypotheses

As no comparable study had investigated experienced autonomy after a non-hypothetical nudge, we were not able to base the hypotheses on earlier findings, however, predictions can be made based on related literature. Based on the literature suggesting that people may overestimate the impact of future events (Gilbert & Wilson, 2009), expectations of how people would react to nudges might not translate into experiences. Additionally, as participants in the nudge conditions will likely not be aware of the nudge, they will in turn probably not feel any threat to their autonomy and therefore have no reason to be less satisfied with their choice. In other words, we hypothesize that the small negative effect that people expect nudges to have on autonomy that was found in previous work (Wachner et al., 2020; but not replicated in Study 1) does not become reality when people are actually nudged, and thus that the nudge conditions do not differ from the control conditions in terms of autonomy and satisfaction.

Results

Descriptives

Over all conditions, 51% of the participants chose the long questionnaire. Similar to Study 1, participants reported relatively high levels of autonomy ($M = 3.83$, $SD = 0.65$), satisfaction ($M = 4.12$, $SD = 0.57$). Autonomy and satisfaction were moderately correlated ($r = .42$, $p < .01$).

Randomization check

We conducted an ANOVA with condition as the independent variable and age as the dependent variable and found that randomization was successful ($p = .450$). We also conducted a Chi-squared test and found that sex was successfully randomized across conditions ($p = .301$).

Nudge effectiveness

In order to be certain that we investigate the effects of nudges on autonomy and satisfaction after actual choices that were influenced by nudges, we first tested whether the nudge had been effective. We conducted a logistic regression with choice as the dependent variable and condition as the independent variable. While there was no significant difference between the control (45% long version) and social norm nudge condition (48% long version, $p = .602$), the default nudge condition (61% long version) differed significantly from the control condition ($p = .006$). For participants in the default nudge condition, the odds were 1.90 times higher, compared to the control condition, that they would choose the long version of the questionnaire.

Autonomy and Satisfaction

We conducted a MANOVA with autonomy and satisfaction as the dependent and condition as the independent variable. The multivariate effect was not significant Wilk's $\Lambda = .994$, $F(2, 450) = 0.71$, $p = .585$ (See Figure 4.2 for means and standard errors of all conditions for autonomy and satisfaction).

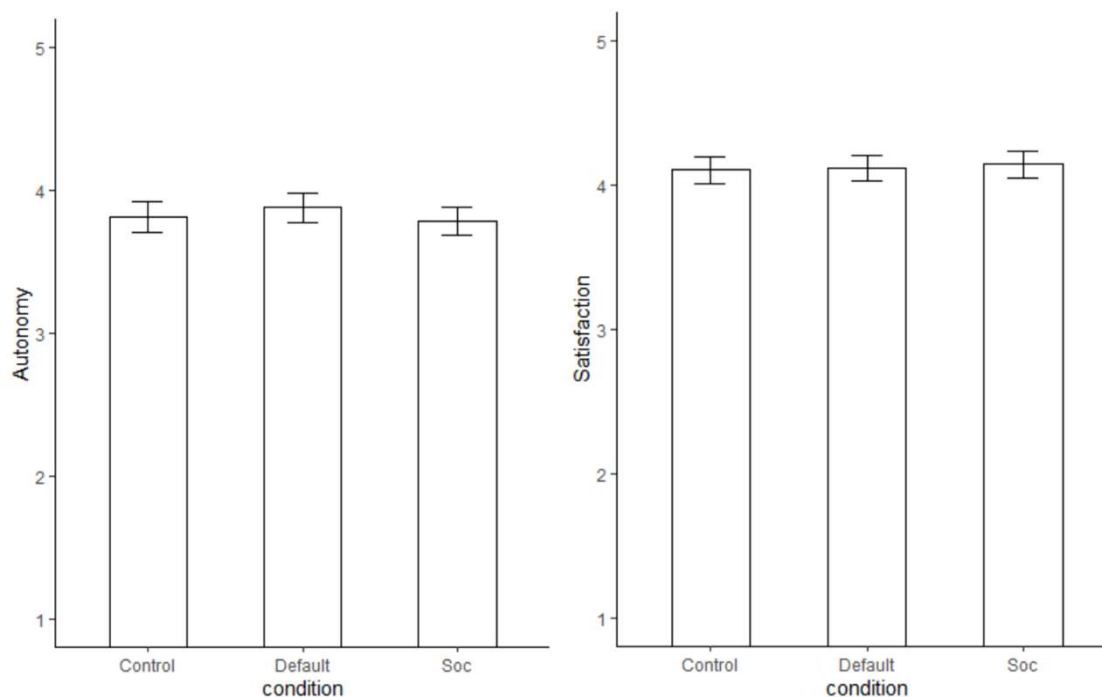


Figure 4.2. Means and standard errors for autonomy and satisfaction.

Discussion

Similar to Study 1, participants across conditions felt quite autonomous and satisfied about their choice. The default nudge was effective in promoting the long version of the questionnaire, but the social norm nudge was ineffective. However, as hypothesized, the nudge conditions did not differ from the control condition in terms of autonomy or satisfaction with the choice. This indicates that the behavior change that comes with the default nudge has no negative impact on any of the experiences measured in this study. This finding is in contrast to the (marginally) significant difference in participants' *expectation* of autonomy between the default nudge and the control condition in an earlier (hypothetical) study (Wachner et al., 2020). As a final test of the effects of nudges on expected vs. actual autonomy, we decided to replicate both Study 1 and Study 2 in one combined design for Study 3. Similar designs as in Study 1 and Study 2 will be used, but the sample size will be increased to reliably determine potentially smaller effects. Additionally, hypothetical and

actual nudge data will be collected in one wave, which will minimize influences of sampling and timing.

Furthermore, one could argue that Study 1 and Study 2 were not fully comparable, because in Study 2 participants did not get an explanation of the framing (i.e., default nudge, social norm nudge, control), whereas participants in Study 1 were provided with explanations in the hypothetical scenarios. While we did so on purpose because we wanted to find out whether the experience of autonomy in real life settings differs from what we expect when we discuss the potential consequences of nudging (implicating that one is aware of what a nudge does), we consider it important to address the factor of explanation once again in Study 3. This will allow us to examine whether and how explanation affects autonomy both in hypothetical and actual settings. To keep the sample size and number of conditions in Study 3 manageable, and because the social proof nudge was not determined effective in Study 2, we decided to incorporate only the default nudge as it is generally viewed as a nudge with relatively high potential violation of autonomy (Jung & Mellers, 2016).

Study 3

Pre-registration

This experiment was pre-registered at <https://aspredicted.org/fi6pi.pdf>.

Methods

Participants

We recruited 1322 participants (48.3% female, mean age 28.1, $SD = 9.56$ [range 18–73]) through the online service Prolific. Participation took on average 3.25 min and was

rewarded with 0.40£. Only Prolific users who had not participated in earlier studies of this research line and were fluent in English were eligible.

Design and Procedure

This online experiment used an asymmetrical three-factor between-subject design, with nudge (default nudge vs control), realism (choice vs hypothetical), and explanation (default nudge with explanation vs. default nudge without explanation vs. control condition without explanation) as the independent variables. This results in six conditions: Choice Nudge Without Explanation (CN-), Choice Nudge with explanation (CN+), Choice Control without explanation (CC-), Hypothetical Nudge without explanation (HN-), Hypothetical Nudge with explanation (HN+), and Hypothetical Control without explanation (HC-; see Table 4.1).

The choice conditions were by and large similar to the default and control conditions in Study 1, with the addition of a choice condition with an explanation (which was presented simultaneously with the nudge). This condition was added to account for “explanation” as a possible confounding factor between Studies 1 and 2. In contrast to Study 2, where participants could immediately make a decision, in Study 3, participants had to wait ten seconds before they could submit their answer (15 seconds for CN+). The hypothetical conditions were also by and large similar to the default nudge and control condition in Study 2, with the addition of a nudge condition without an explanation (HN-). Also, in contrast to Study 2, the control condition did not include an explanation. Finally, the explanation in the hypothetical nudge condition was given simultaneously with the hypothetical question, instead of on the next page as in Study 1.

Table 4.1.

Conditions in Study 3.

Realism	Control	Default Nudge	
	Without Explanation	Without Explanation	With Explanation
Choice	CC-	CN-	CN+
Hypothetical	HC-	HN-	HN+

Materials

Manipulation Recollection. Participants in the choice conditions were asked the question, “What was special about the way we asked whether you would like to participate in the long version of the questionnaire?”. They could choose from five answers, stating that either one of the answers was written in bold, or already selected, or that nothing was special, with always only one answer being correct.

Pressure. Participants were asked how much pressure they (expected to) experience to select ‘Longer Version’ as their answer. Participants could answer on a slider ranging from 0 (None at all) to 100 (Extreme Pressure).

Planned Analyses

The aim of Study 3 is to replicate the findings of Study 1 and Study 2 and to do this in one and the same study to minimize the possibility that any differences between hypothetical and choice conditions are due to timing or sampling of the different studies. For both the hypothetical and choice conditions, we seek to compare the individual nudge conditions to their respective control conditions (i.e., to run test within the two condition clusters). Differences between the hypothetical and choice conditions might be due to a variety of reasons, for example, a greater indifference of participants in hypothetical conditions, or that

the inability to report a decision in the hypothetical conditions already leads to a decline in autonomy, or that participants in hypothetical conditions are more prone to think from a moral viewpoint and participants in the choice conditions from a pragmatic viewpoint. We therefore find direct comparisons between the hypothetical and choice conditions difficult to interpret and focus on comparisons to the respective control condition within the two reality conditions separately

The preregistered main hypotheses are that (1) within the choice conditions, autonomy and satisfaction do not differ between the conditions, meaning that neither a nudge, nor its explanation, affect these measures. To test this claim, we will conduct a one-way MANOVA with autonomy and satisfaction as the dependent variables and choice conditions (CC-, CN-, CN+) as the independent variable. However, (2) within the hypothetical conditions, we expect autonomy and satisfaction to differ, with the nudge condition featuring an explanation scoring lowest and the control condition scoring highest on these measures. To test this claim, we will conduct a MANOVA, with autonomy and satisfaction as the dependent variables and the hypothetical conditions (HC-, HN-, HN+) as the independent variable.

Results

Descriptives

Similar to both Study 1 and Study 2, participants reported relatively high (expectations for) autonomy ($M = 3.88$, $SD = 0.67$) and satisfaction ($M = 4.05$, $SD = 0.62$). Autonomy and satisfaction were strongly correlated ($r = .53$, $p < .01$).

Randomization check

We conducted an ANOVA with condition as the independent variable and age as the dependent variable and found that randomization of age over the conditions was successful (p

= .460). A Chi-squared test also showed that sex was successfully randomized across the conditions ($p = .200$).

Manipulation Check

Choice Conditions. A logistic regression with Choice (on the nudged question) as the dependent variable and choice conditions as the independent variable with the choice control condition (CC-) as the reference group was conducted to test whether the nudge in the choice conditions was indeed effective. The results showed that neither the choice nudge condition without explanation (CN-) (49.5% long version, $p = .200$) nor including an explanation (CN+) (49.3% long version, $p = .214$) chose significantly different from choice control condition (CC-) (43.4%). We therefore conclude that the nudges were ineffective.

However, when we only included participants who remembered the nudge manipulation, as an indication of paying attention to the manipulation and the questions, the choice nudge condition without explanation (CN-) was effective (CC- 45% long version, CN- 61.6% long version), with percentages being comparable to Study 2 (control: 45%, default nudge: 61%). Testing our main hypotheses about autonomy and satisfaction for this subsample did not yield any different results from the complete sample, therefore all of the analyses below are reported for the complete sample.

Aftereffects of nudging: autonomy and satisfaction

Choice Conditions. In order to test hypothesis one, we conducted a MANOVA with autonomy and satisfaction as the dependent variables and the choice conditions (CC- / CN- / CN+) as the independent variable. As expected, the multivariate effect was not significant Wilk's $\Lambda = .997$, $F(2, 659) = 0.444$, $p = .780$. As we preregistered more specific comparisons, we continued the investigation of effects on autonomy and satisfaction, despite a negative overall effect of condition. However, none of the univariate tests were significant either (all $ps > .630$). Given the results, we conclude hypothesis one to be supported.

Hypothetical Conditions. To test the second hypothesis, we conducted a MANOVA with autonomy and satisfaction as the dependent and hypothetical conditions (HC- / HN- / HN+) as the independent variable. As expected, the MANOVA resulted in a significant multivariate effect, Wilk's $\Lambda = .982$, $F(2, 657) = 3.003$, $p = .018$. Univariate tests showed that both autonomy, $F(2,657) = 4.972$, $p = .007$ and satisfaction, $F(2,657) = 4.109$, $p = .017$, differed significantly between the conditions. We subsequently conducted two ANOVAS, with autonomy and satisfaction as the dependent variables, followed by Tukey HSD post-hoc tests, to inspect which conditions differ specifically. As expected, the hypothetical control condition (HC-) scored highest on autonomy ($M = 3.90$, $SD = 0.60$), followed by the hypothetical nudge condition without explanation (HN-) ($M = 3.78$, $SD = 0.73$) and the hypothetical nudge including an explanation (HN+) ($M = 3.69$, $SD = 0.73$). However, only the difference between hypothetical control condition (HC-) and the hypothetical nudge condition including an explanation (HN+) reached significance (HN- vs. HC-: $p = .154$; HN+ vs. HC -: $p = .005$, $d = 0.31$; HN+ vs. HN-: $p = .395$). Similarly, when looking at satisfaction we found that as expected, the hypothetical control condition (HC-) ($M = 4.08$, $SD = 0.57$) scored highest on satisfaction followed by the hypothetical nudge condition without explanation (HN-) ($M = 4.00$, $SD = 0.66$), with the hypothetical nudge condition including an explanation (HN+) scoring the lowest ($M = 3.92$, $SD = 0.58$). Again, only the difference between the hypothetical control condition (HC-) and the hypothetical nudge condition including an explanation (HN+) was significant (HN- vs. HC-: $p = .350$; HN+ vs. HC -: $p = .012$, $d = 0.29$; HN+ vs. HN-: $p = .293$; See Figure 4.3 for means, standard errors, and significant differences between conditions on autonomy and satisfaction). Given the results, we conclude hypothesis two is partially supported.

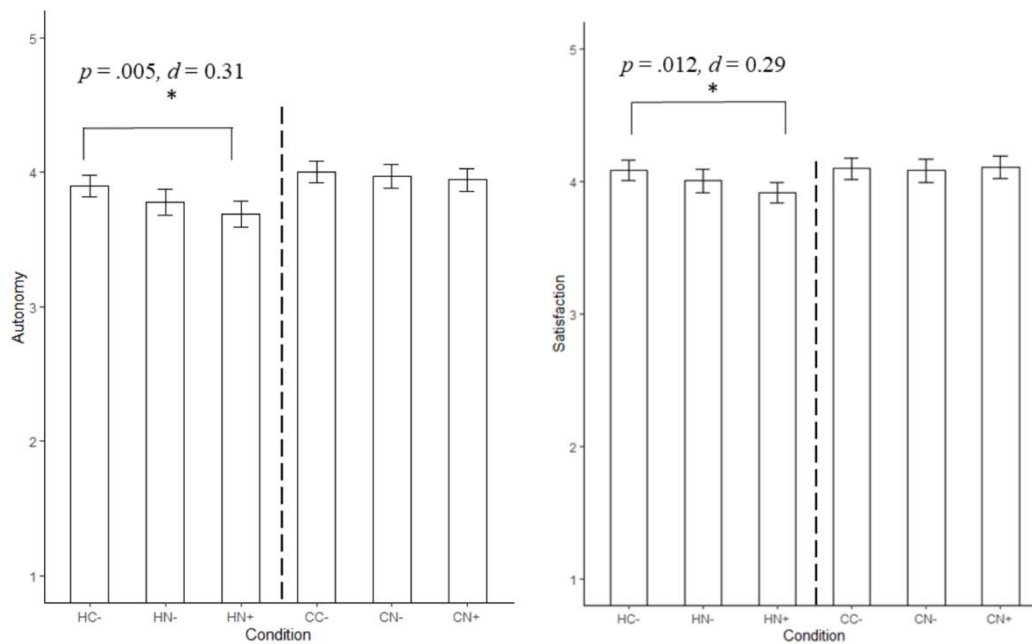


Figure 4.3. Means and standard errors for autonomy and satisfaction.

Correlations between Pressure, Autonomy and Satisfaction

All Conditions. We calculated correlations between pressure and autonomy, as well as pressure and satisfaction within the four conditions without explanation (HC- / HN- / CC- / CN-). As expected, pressure negatively correlated with both autonomy ($r = -.25, p < .001$) and satisfaction ($r = -.31, p < .001$). We calculated the same correlations within HN+ and CN+, expecting them to be insignificant. However, we again found both pressure and autonomy ($r = -.27, p < .001$) and pressure and satisfaction ($r = -.28, p < .001$) to be negatively correlated.

Discussion

Similar to Study 2, we found no negative effect of nudges on autonomy or satisfaction in actual nudge settings. However, negative effects of nudges on autonomy and satisfaction are expected in hypothetical scenarios. In Study 3, these effects for the hypothetical nudge were small but significant, similar to Wachner and colleagues (2020). Participants only felt

less autonomous and satisfied after being presented with a hypothetical nudge that included an explanation, while a hypothetical nudge without an explanation did not score significantly lower than the control condition. This suggests that people are not immediately skeptical of the impact of a nudge on autonomy: only when the nudge was explained to them, they feared that the nudge might threaten their autonomy. However, it is uncertain whether this is due to the explanation of how a nudge works or to drawing attention to the presence of a nudge. Taken together, these findings corroborate our expectation that negative expectations of the effects of nudges do not translate into negative effects of nudges on experiences.

Finally, the two choice nudge conditions were not effective in promoting the “Long Version” choice in the initial sample. When only analyzing data from participants who passed the manipulation recollection, the choice nudge without explanation (CN-) was an effective nudge but the choice nudge including an explanation (CN+) was not. Appeasing our earlier concerns, both the sample in which the nudge was effective and the sample in which it was not effective come to the same conclusions in virtually all analyses, suggesting that ineffectiveness of the nudge does not alter our main findings regarding autonomy and satisfaction. Nevertheless, the fact that the default nudge was not effective, and that the transparent nudge condition was less effective than the nudge without explanation, contradicts multiple studies using this specific nudge (Wirtz et al., 2003) and studies comparing the effectiveness of transparent and non-transparent nudges (Bruns et al., 2018; Paunov et al., 2018; Paunov et al., 2019) and remains an important limitation that warrants caution in interpreting our findings.

General Discussion

In the present series of studies, we investigated whether people expect nudges to harm their autonomy and other decision-making experiences and whether nudges harm autonomy

when people are actually being nudged. Participants' *expectations* give us insights into how people think nudging affects autonomy. This is important for when people notice that they are being nudged, or when the use of nudges as a public policy instrument is discussed by laymen or in professional circles, as opinions will be largely derived from expectations of nudges' influence. Understanding participants' *actual experiences* after being nudged is crucial for the design of nudges that do not hurt autonomy, as this has been found to lead to a variety of negative effects on well-being (Wei et al., 2005; Van den Broeck et al., 2016) and could also negatively affect subsequent related decisions.

Results from a previous study (Wachner et al., 2020), demonstrating small, but significant negative effects of hypothetical nudges on expected autonomy, were not supported in Study 1 but replicated in Study 3, giving credit to the notion that people expect default nudges to harm their autonomy and satisfaction. In Studies 2 and 3, the results showed that when people were actually nudged, autonomy and satisfaction were not affected. These results confirm our hypothesis that nudges are expected to be hurtful to autonomy and satisfaction when people speculate about how they would feel and are asked to imagine themselves in these situations, while these effects do not occur when people are actually nudged. Additionally, when the nudge was hypothetical, participants expected autonomy and satisfaction to be violated only when the nudge was explained to them. Apparently, when the nudge is explained in hypothetical scenarios, people are more concerned about its effects.

Policy makers familiar with the debate regarding the ethics of nudging, and particularly autonomy, may recognize these findings as they suggest that people might be somewhat skeptic of nudges being implemented because of fearing a threat to their autonomy and satisfaction. In the current studies, we did not find an explanation of the nudge to affect autonomy and satisfaction. This is in line with an earlier study in which, similarly, no effect of transparency was found (Wachner et al., 2020b).

Despite the concerns people may have regarding their autonomy when they anticipate being nudged, the results for the choice nudge conditions suggest that people do not feel less autonomous and satisfied. It can be argued that these inaccurate expectations are due to participant's inexperience with nudges and that people's predictions will get more accurate as the use of nudges becomes more widespread. However, we expect that pessimistic expectations on the effects of nudges will prevail, due to the already mentioned overestimation effects, such as impact bias (Wilson & Gilbert, 2013) and immune neglect (Wilson & Gilbert, 2005). Additionally, as people can be unaware of a nudge being present (and its negative effect on autonomy being absent), they may overlook encounters with nudges that should alter their expectations. We argue that it is therefore important to pay attention to this when designing nudges so as to reduce the expected threat to autonomy.

Overall, our findings are good news for the implementation of nudges. In all conditions, participants expected or experienced relatively high levels of autonomy. Particularly in choice nudge conditions, experienced autonomy was not affected by nudges. In addition, we found in choice conditions that an explanation of the nudge, which makes the decision maker aware of the nudge and the working mechanism, did not negatively affect autonomy and satisfaction, indicating there is no need to refrain from using transparent nudges based on autonomy considerations, as was also previously found (Wachner et al., 2020b). Note that while in the current study the explained nudge was not effective, several studies have found transparent nudges to be just as effective as non-transparent nudges (e.g., Bruns et al., 2018; Paunov et al., 2019; Wachner et al., 2020b).

The current paradigm that was used to confront participants with (hypothetical) nudges posed only limited stakes to participants. As nudges vary greatly in the heuristics they rely on, their underlying mechanisms, and in the circumstances to which they are applied, a single set of studies prove limited in its generalizability. Future research should replicate the

current study with different kinds of nudges, different fields of behavior (e.g., health behavior, saving behavior, etc.), and with choices for which stakes are higher.

All in all, we found that expectations and experiences of autonomy are less of an issue in regards to nudges as might have been expected (Bovens, 2009; Hansen & Jespersen, 2013). Only in hypothetical nudge scenarios did we see negative effects of nudges in one of our studies, but even then autonomy was still expected to be relatively high. The current paper found little to no support for the claim of negative effects of nudges on actual experienced autonomy.

Appendix

Autonomy Questionnaire

My choice is highly compatible with my goals and interests.

I feel very strongly that my choice perfectly fits my taste.

I feel that my choice is definitely an expression of myself.

I feel very strongly that I had the opportunity to have influence on my choice.

(Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree)

Satisfaction with Choice Questionnaire

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, neither agree nor disagree, agree, strongly agree)

Chapter 5

Defaults may save lives, but do they compromise autonomous choice?

This chapter is submitted for publication as:

Wachner J, Adriaanse M.A., Van Den Hoven, M., & De Ridder D.T.D. Defaults may save lives, but do they compromise autonomous choice?

The data collected for this chapter is available at:

https://osf.io/2whfn/?view_only=e1ce444087eb4c7abccbda4a0cac4db1

Acknowledgement of author contributions:

JW, MA, and DR contributed to the conception and JW, MA, MH and DR contributed to the design of the study. JW programmed the studies, performed the data analyses, and wrote a first draft of the manuscript. MA and DR provided suggestions for improvement.

Abstract

Defaults lead to a substantial increase in the number of people being registered as an organ donor, which may eventually save lives. However, it is unclear whether defaults violate personal autonomy of the people being registered. The implementation of a new Donor Act in the Netherlands, providing people with the opportunity for active registration before being defaulted, allowed for examining to what extent default registration affects autonomy. In an online survey among a representative sample (N = 1259), four groups were compared: people (1) who had registered their status prior to the Donor Act, (2) who had not yet received an invitation for default registration, (3) who had received an invitation and then registered their choice, and (4) who had received an invitation but took no action and were defaulted into being registered as a donor. The latter group reported the lowest levels of autonomy as compared to the other three groups. We conclude that default organ registration does not compromise autonomy except for a minority of people who pass the opportunity to register themselves.

In 2019, 67 people in the Netherlands died waiting for a kidney transplant, and another 112 got off the waiting list for a kidney as their condition got too bad to still receive a transplant (Nierstichting, n.d.). In comparison to other European countries, the Netherlands has a low number of organ donors (Ploeg, Berger, Abdo, & Reinders, 2017). In 2003, Johnson and Goldstein brought attention to the big gap in donor registration percentages between countries, which could not be explained by factors like religion, education levels and other differences between populations (Johnson & Goldstein, 2003). Rather, whether or not countries employed defaults with people having to actively opt out instead of opt in to promote registration as a donor played a major part in explaining the difference between countries.

Defaults are part of a group of behavior change techniques called ‘nudges’. Nudges were introduced by Thaler and Sunstein as an umbrella term for strategies that make strategic use of people’s non-reflective decisions to promote desirable choices (2008). Nudges have been 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). Defaults specifically are expected to affect behavior through various mechanisms that relate to non-reflective decision making, including inertia (Madrian & Shea, 2001), loss aversion (Baron & Ritov, 1994), status quo bias (Suri, Sheppes, Schwartz, & Gross, 2013), and suggesting a norm or recommendation (McKenzie, Liersch, & Finkelstein, 2006).

Defaults are frequently used and found to be effective across various domains and behaviors including the uptake of green energy arrangements (Liebe, Gewinner, & Diekmann, 2021) and donating to charity (Goswami & Urminsky, 2016). It is therefore not surprising that Johnson and Goldstein found that in countries where an opt out arrangement is in place, more citizens are registered as donors than in countries where citizens have to take

action themselves to be registered as a donor (opt in; Johnson & Goldstein, 2003). The Netherlands, with its low number people registered as potential organ donors, unsurprisingly, employed the less effective opt-in format.

Acknowledging the problematic low number of organ donors and the potential effectiveness of an opt-out format as opposed to the current opt-in format to increase donor registrations, the Netherlands recently introduced the new Donor Act, changing donor registration into to an opt-out system (Government of the Netherlands, 2021). While this change was expected to be highly effective in increasing the number of registered donors, it was, however, not uncontroversial (NOS, 2018). In particular, concerns were voiced regarding the ethical aspects of the government manipulating such a highly personal and impactful choice and it was suggested that the new opt-out format could negatively impact individuals' experience of autonomy (Pennings, 2002; we will use the term 'autonomy' to refer to the personal experience of autonomy). These ethical concerns, and concerns regarding autonomy specifically, are not unique for the case of organ donation or for the Netherlands but are central in heated debate in the broader literature on nudging as well as a frequent barrier to implementation of nudges in practice (Vugts et al., 2020; De Ridder, Kroese, & Van Gestel, 2020).

Opponents of nudges argue that nudges may have a negative effect on autonomy because they take advantage of automatic thinking and thus circumvent deliberate decision making (Hansen & Jespersen, 2013). Nudges are also criticized because their presence and influence are often undetected or underestimated by the decision maker (Bovens, 2009; Schmidt & Engelen, 2020). However, these claims are mostly based on abstract notions on decision making. A strong empirical basis to support claims about these unfavorable effects of nudging on autonomy is lacking. In fact, to date the few studies that have empirically investigated the effect of defaults on autonomy showed only small negative effects in

hypothetical scenarios (Wachner et al., 2020; Wachner et al., 2021), including one study on organ donation (Steenart, Crutzen, & De Vries, 2020). However, results from hypothetical studies may be very different compared to when people are actually confronted with the default nudge in real life (Wachner et al., 2021; Wachner et al., 2020b) and the studies employing real decisions only investigated decisions with very low stakes, such as being defaulted into choosing a 5 min longer version of a questionnaire (Wachner et al., 2020b; Wachner et al., 2021). Clearly, these findings cannot be extrapolated to the complex context of organ registration decisions. Whether changing from an opt-in to an opt-out arrangement when registering for organ donation negatively impacts individuals' autonomy thus remains an open question. With the present research, we employ the transformation of the Dutch donation registration system to conduct a quasi-experimental study aimed at addressing this important issue.

The stepped-wedged introduction of the new Donor Act in the Netherlands provides a unique opportunity to investigate the effects of a default on autonomy in real life. The Donor Act was implemented in the Netherlands in June 2020 by sending a letter to every citizen who had, by that time, not yet recorded their choice (either or not in favor of registration as a donor) in the Dutch organ donation registry, urging them to register their choice. Should they not register their choice (to be a donor, to not be a donor, to let a specific person decide, or to let relatives decide), they received a second letter, and should they not register their choice within the next six weeks upon receiving the second letter, they would be registered as a donor (under the label 'No objection to organ donation') in the Donor Register by default.

Crucially, the timing of receiving the first letter was dependent on the province of residence, which means that at the time of data collection for this study, individuals in some provinces were still waiting to receive their first letter, some had just received the second letter, and for others the six-week waiting period after receipt of the second letter had already

passed. As a result, we could compare individuals who would not be subjected to a nudge as they were already registered before the introduction of the Donor Act, to the target population consisting of people who were in expectation of an invitation to register by default or already received at least one letter of invitation. Moreover, the province-based timing of implementation of the Donor Act allowed for the opportunity to compare within the nudge condition individuals who had already actively registered their choice upon receiving the letter to individuals who were inactively being defaulted into being registered as an organ donor.

In order to examine whether default registration as an organ donor poses a threat to autonomy, we thus created different groups that allowed for comparing autonomy in people who already registered their choice before the implementation of the new default registration (Group 1), people who did not already register their choice and were still waiting to be invited to register (Group 2), people who were invited to register and either actively responded by registering (Group 3) or did not respond to this invitation (Group 4). We did so by asking about 1200 participants about their registration status and their experience of autonomy upon making a decision. We also assessed participants' experience of competence in making the decision and satisfaction with their decision as these constructs are closely related to autonomy (Wachner et al., 2020; Wachner et al., 2020b; Wachner et al., 2021). Finally, we asked all participants to what extent they experienced pressure when making their decision as this has been found to be associated with autonomy (Wachner et al., 2020; Wachner et al., 2020b; Wachner et al., 2021). For ethical reasons, we did not directly ask participants what choice they registered but focused on their experience of autonomy when making this decision. Ethical approval for the study was obtained from Ethics Committee of the Faculty of Social and Behavioural Sciences of Utrecht University, filed under number 21-0079.

Methods

Participants

Participants were recruited via a Dutch online panel agency (Flycatcher.eu). The recruitment was performed in accordance with the declaration of Helsinki. Informed consent was obtained from all individual participants included in the study. Out of the 1897 Flycatcher panel members who were invited, 1185 completed the survey. The sample is representative of the Dutch adult population in terms of gender, age, education, and region (see Supplementary Materials for details).

Procedure

After giving informed consent, participants were asked six questions regarding their donor registration status in order to assign them to one of four groups, (see Table 5.1 and materials). Afterwards, participants saw a brief description of their current registration status based on their answers and were then asked to fill in questionnaires on autonomy, competence, and satisfaction (all on 5 point scales). Additionally, participants indicated on a slider from 0 to 100 how much pressure they experienced to register as a donor. Finally, participants were debriefed and thanked for their participation. They were also provided with links to check on their current donor registration status.

Materials

All questionnaires can be found in the Supplementary Materials.

Registration status. This routed questionnaire comprised four questions (see Figure 5.1). A total of 16 participants who answered ‘no’ to all questions and therefore fell into the categories of ‘will definitely not actively register as a donor’ (N = 6), ‘will definitely actively register as a donor’ (N = 9), or ‘not sure whether or not to register’ (N = 1) was excluded from all analyses as the sample sizes, even when summed into one group, were too small for a meaningful examination.

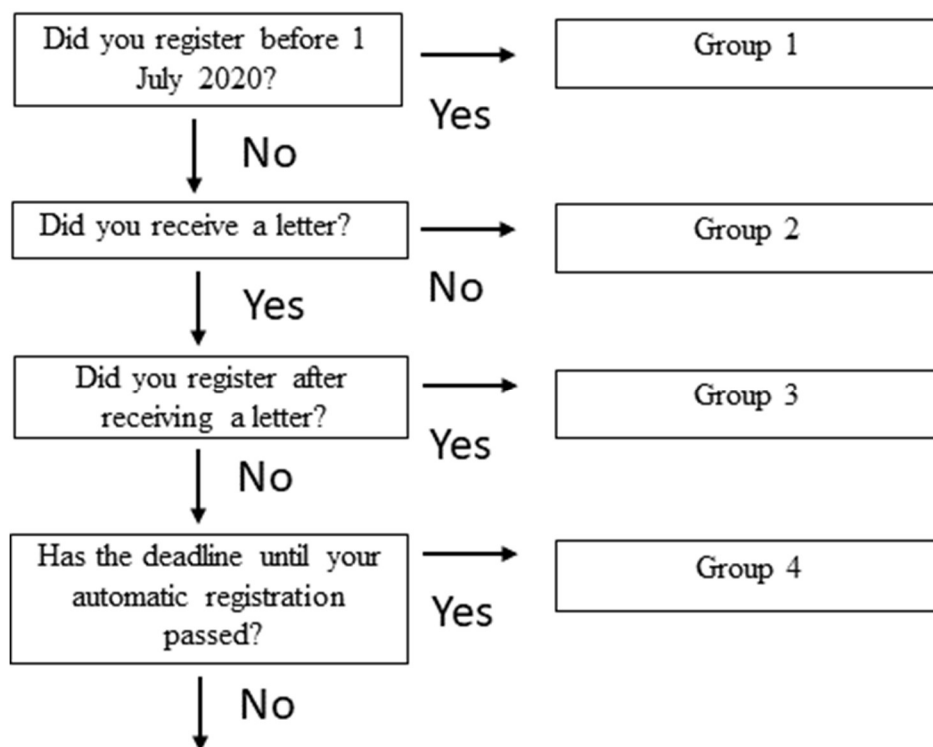


Figure 5.1. Flowchart of the routed questionnaire on registration status.

Autonomy. Autonomy was measured with nine items (e.g., ‘I felt free to choose what I wanted.’) on a 5 point scale, ranging from 1 = “totally disagree” to 5 = “totally agree” (Vugts, Van den Hoven, De Vet, & Verwij, 2020b). Items were presented in randomized order for each participant.

Decision Competence. Decision Competence was measured with six items (e.g., ‘I was pretty skilled at making this decision.’) on a 5 point scale, ranging from 1 = “totally disagree” to 5 = “totally agree” (Wachner et al., 2020; Wachner et al., 2020b; Wachner et al., 2021). Items were presented in a randomized order for each participant.

Decision Satisfaction. Decision Satisfaction was measured with five items (e.g., ‘My choice is the right one for my situation.’) on a 5 point scale, ranging from 1 = “totally disagree” to 5 = “totally agree” (Sainfort & Booske, 2000). Items were presented in a randomized order for each participant.

Demographic data. Data on participants' gender, age, level of education, and region were provided by the panel agency. Details are provided in the Supplementary Materials.

Results

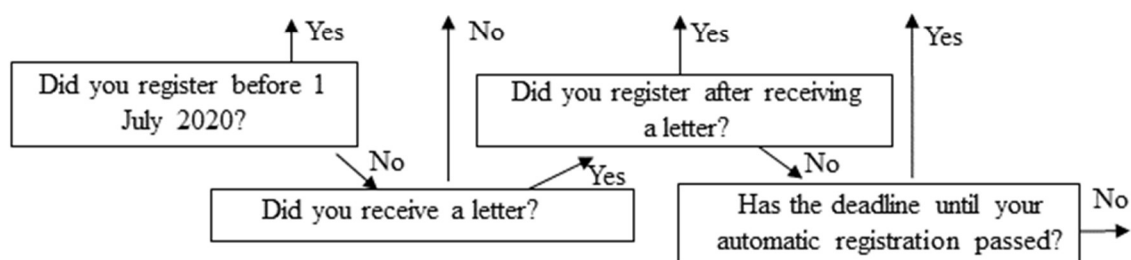
Descriptives

Based on their responses to the registration status questionnaire, participants were categorized into the four aforementioned groups. Table 5.1 provides an overview of the sample size, gender composition and age for each group. A table with means and standard deviations, as well as correlations of a broader set of demographics can be found in the Supplementary Materials.

Table 5.1

Means and standard deviations of background information per group and total.

Variable	Group 1	Group 2	Group 3	Group 4	Total
N	929	67	111	52	1159
Gender	50.6% female	47.8% female	45.9% female	42.3% female	49.6% female
Age	33.8 (17.3)	37.7 (17.8)	35.1 (17.6)	31.1 (17.7)	34.0 (17.4)



Autonomy, competence and satisfaction

The pattern of results (see Figure 5.2) first of all demonstrates that participants in all groups reported on average relatively high levels of autonomy, with mean scores in all conditions above the neutral point (3.0) of the scale. The same was true for competence and satisfaction.

A MANOVA with autonomy, competence and satisfaction as the dependent variables, and group as the independent variable was conducted to test the differences between the four groups. This yielded a significant multivariate effect, Wilk's $\Lambda = .801$, $F(9, 2806) = 29.7$, $p < .001$, $\eta^2 = 0.067$. The univariate effects were also all significant: Group significantly predicted autonomy $F(3, 1155) = 75.6$, $p < .001$, competence $F(3, 1155) = 68.1$, $p < .001$, and satisfaction $F(3, 1155) = 68.1$, $p < .001$.

Tukey HSD post-hoc tests revealed significant differences between all groups on all variables $ps < .026$ (for details see Supplementary Materials). As indicated in Figure 5.2, among the target population for the nudge (those who were not yet registered on June 1st 2020, Groups 2-4), participants who were exposed to the nudge and actively registered (Group 3), reported on average higher levels of autonomy, $M = 3.95$, $SD = 0.54$, compared to participants who had not yet received a letter of invitation to register (Group 2), $M = 3.62$, $SD = 0.66$, and participants who had received a letter but did not respond to this letter (Group 4), $M = 3.28$, $SD = 0.66$. The latter group of participants, those who let the deadline pass, reported the lowest level of autonomy of all groups. In contrast, participants who had responded positively to the invitation letter by indicating their preferred choice (Group 3) had near to similar levels of autonomy as participants who had indicated their choice prior to the introduction of the new Donor Act (Group 1), $M = 4.20$, $SD = 0.50$. A similar pattern was observed for the dependent measures competence for making a decision and satisfaction with the decision (See Figure 5.2).

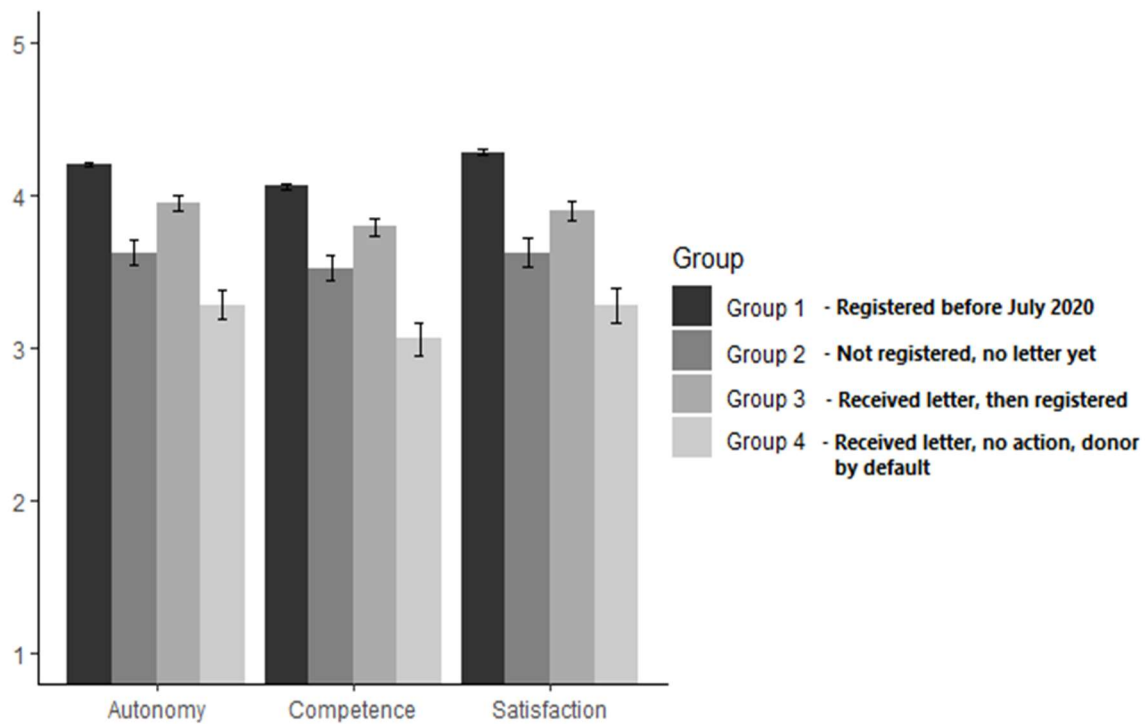


Figure 5.2. Means with standard errors for autonomy, competence, and satisfaction, for all groups.

Pressure

An ANOVA was conducted to test whether the groups differed in the pressure they experienced to register as a donor. The effect of group was significant $F(3, 1155) = 24.41, p < .001$. A Tukey HSD post-hoc test revealed significant differences between Group 1 and all other groups (all $ps < .026$), indicating that all participants who received the letter (Groups 3 and 4) or who were waiting to receive the letter (Group 2) experienced more pressure compared to the participants who had already registered (Group 1). No other comparisons were significant. See Figure 5.3 for means and differences between the groups on pressure.

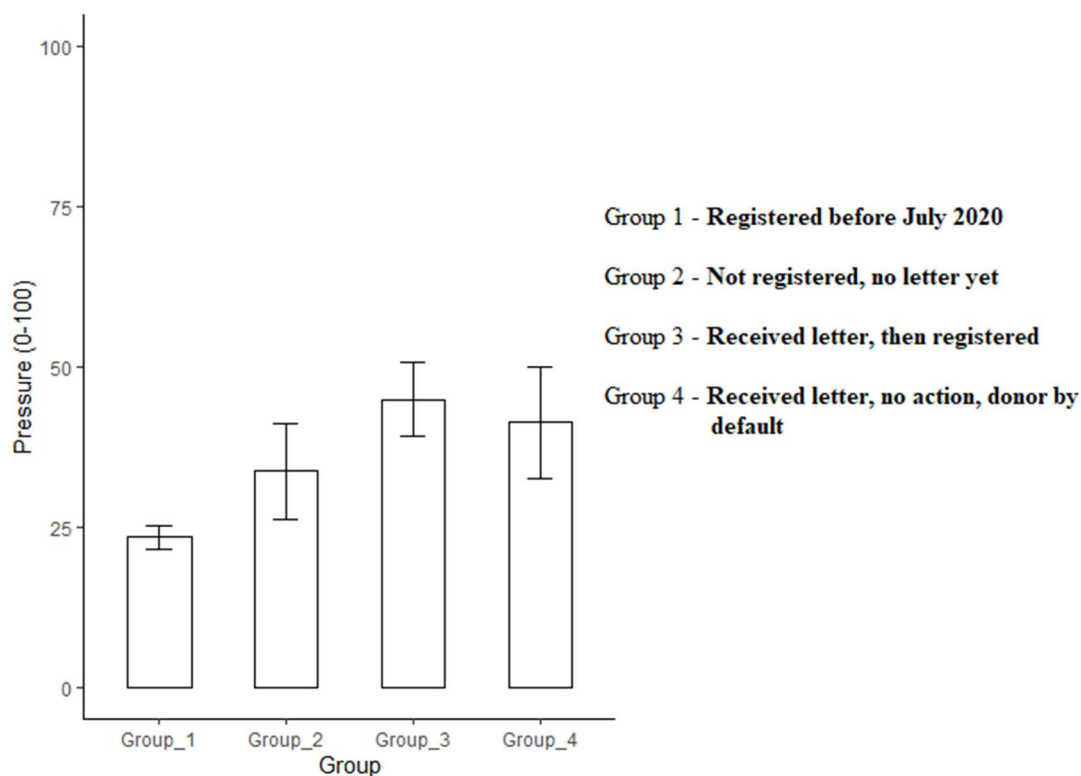


Figure 5.3. Means with standard errors for pressure for all groups.

Discussion

The aim of the current study was to investigate how the newly implemented Donor Act in the Netherlands that employs a default to promote donor registration affects personal autonomy. To that end, we asked participants about their registration status, exposure to the default nudge (receipt of the letter) and their response to this nudge (active registration or not) on their experience of autonomy, as well as decision making competence, satisfaction with their decision, and experienced pressure to make a decision. The results show that individuals who had registered their choice before the new Donor Act was implemented reported the highest levels of autonomy. This is not surprising, as they made their own decision, even before being urged to do so by invitation and were as a result not confronted with the new default arrangement. The most noticeable result is the low experience of

autonomy in individuals who received an invitation to register and let the deadline pass without taking the opportunity for actively registering either or not as a donor (Group 4).

Compared to the group of individuals who had not been exposed to the nudge because they were still awaiting an invitation letter (Group 2), the low levels of autonomy in people who did not respond to the nudge (Group 4) could be interpreted as evidence that there is a negative relationship between exposure to a default nudge and autonomy. However, people who responded to the nudge by actively registering upon receiving the letter (Group 3) were also confronted with the new default, but actually scored higher on autonomy than people who did not respond (Group 4) and even higher than people who had not yet received the letter of invitation (Group 2). In fact, the people who did respond to the invitation to register came close to the high level of autonomy of people who had already registered before implementation of the default arrangement (Group 1). Based on this pattern of results with marked differences in autonomy and related concepts between groups, we argue that the most striking finding of this study is the observation that it is not the nudge itself that affects autonomy but rather the response to the nudge, i.e., whether invitees take the opportunity to either or not register themselves (in whatever way).

One could argue that people who did not actively register upon being invited to do so may not want to exercise autonomy because they did not want to be confronted with the difficult question of organ donation or did not want to be personally responsible for this decision. If this would be the case, a lower level of experienced autonomy would not be necessarily negative. However, the pattern of results for decision making competence and satisfaction with one's choice mimicked the findings on autonomy. This suggests that lower autonomy was experienced negatively to the extent that people were less satisfied with their decision and also felt less competent to make this decision. Alternatively, people who felt uncomfortable making this decision experienced lower autonomy as a result. Finally, our

findings on how much pressure people experienced to register themselves as a result of being nudged, reveal that the nudge (invitation letter for default registration) resulted in a higher experience of pressure regardless of how people responded to the invitation. This implies that the differential pattern of autonomy (and competence and satisfaction) between groups who received the letter is not a reflection of how much pressure they felt (see also Wachner et al., 2020; Wachner et al., 2021).

The present findings have important implications for debates about whether and how nudges affect autonomy as well as whether and how nudges should be implemented in public policy. First, our findings inform current debates regarding the ethics of nudging and suggest that nudges are a double-edged sword that lead to an increase in donor registrations while autonomy is preserved. It should be noted, however, that about 30% of invitees did not register their choice upon being invited to do so. This inertia in response to the default may eventually help to increase the number of donor registrations but comes at a cost for experienced autonomy, competence and satisfaction for individuals who did not take the opportunity to express their choice. Future research is needed to investigate in more detail the characteristics of this group, as these might be individuals who are already more vulnerable and lack resources to respond to the invitation to register proactively. This implies that it is crucial to design default nudges in such a way that it increases the odds of active registration while at the same time maintaining or enhancing individual autonomy by, for example, encouraging them to take action themselves.

The present findings also inform the broader literature on nudging as they suggest that for studies examining the (psychological) aftereffects of nudges, it is important to distinguish not only between a no nudge (control) and a nudge (experimental) condition, but also to differentiate between responses to a nudge. Had we lumped together people who either or not responded to the nudge (Groups 3 and 4) as a nudge condition and compared them to people

who had not been nudged (Group 2), we would have concluded that nudges do not affect autonomy. The present analyses in which we differentiate between whether or not people responded to the nudge show that effects are markedly different for these two groups. Finally, it is worth pointing out that in fact the majority of people who received the letter did actively register (111 out of 163 or about 70%) but not all of them did, which indicates that inertia, loss aversion and status quo bias may be less important mechanisms in explaining the effects of defaults. Rather, these findings suggest that implicit recommendation may drive default effectiveness (McKenzie et al., 2006).

Several limitations should be noted. First, an important observation in the current study is that roughly 80% of the participants reported to have already been registered before the new default was put into effect. This is more than expected, as only about 50% of the Dutch population older than 18 was registered in the Netherlands at the time of conducting our study (Donor Register, 2021) and our sample was found to be highly similar in gender distribution, age and education level to the general population. A possible explanation for the discrepancy is that participants were able to choose whether or not to participate in our study, possibly leading to a bias where people who avoid thinking about organ donation and did not register also do not participate in our study.

Second, it is important to point out that our results refer to registration of a choice in the donor register which can range from not being a donor, to being a donor or letting relatives decide. We interpret the pattern of results based on whether people actively registered their choice, but this is at least partly confounded with donor status (all participants in group 2 are not donors and all participants in group 4 are donors). Third, as this was an observational study, it is unclear whether the default and making a choice influenced participant's autonomy, or whether other factors are at play that influence participant's decision making as well as their autonomy. Finally, with the present research we only focus

on autonomy, competence and satisfaction of people considering donor registration, as well as how much pressure they experience. However, with the new Donor Act also comes a new category of donors who are registered as ‘No objection to organ donation’ due to being defaulted into registration as a donor. How this status and not knowing whether the deceased in fact made an active choice to get registered as a donor affects relatives’ experience of donor legitimacy is an important avenue for future research.

Conclusion

In conclusion, our findings show that autonomy after being nudged by default to register as a donor is associated with the response to the nudge rather than to mere nudge exposure. People who take the opportunity to register their donor status in response to a default report higher levels of autonomy, decision making competence and satisfaction with their decision than people who ignore the nudge and end up being registered as a donor at the cost of lower experienced autonomy.

Chapter 6

General Discussion

Acknowledgement of author contributions:

JW conceptualized and wrote the chapter.

The main goal of the current dissertation was to investigate how nudges affect the level of autonomy that decision makers experience. Nudge opponents have argued that nudges might harm the decision maker's autonomy (Bovens, 2009; Hansen & Jespersen, 2013). This needs to be empirically tested because theoretical claims about the potentially negative impact on autonomy (and related effect on well-being) should be substantiated before drawing firm conclusions about harmful implications of employing nudges in public policy. Additionally, autonomy is an important predictor of people's well-being (Wei et al., 2005; Milyavskaya & Koestner, 2011; Van den Broeck et al., 2016; Yu et al., 2018), and negative effects of nudges on autonomy, and in turn on well-being, might decrease or outweigh the benefits that nudges offer through behavior change. Furthermore, the autonomy people experience when making a decision is expected to be linked to their satisfaction with their choice, which likely predicts future decisions (Wirtz et al., 2003). This means that if nudges harm the decision maker's autonomy and in turn satisfaction with their choice, in the long term, nudges might decrease the likelihood of the decision maker choosing the nudged option.

Furthermore, other research questions were investigated in the current dissertation, such as whether people *expect* nudges to harm their autonomy, whether nudge transparency has positive effects on the experience of autonomy, and whether different nudges differ in their effect on autonomy. By investigating how nudges relate to the experience of autonomy and which factors influence this relationship, the current dissertation intends to make significant steps toward a deeper understanding of the downstream consequences of nudging.

In this final chapter, we will summarize the main findings of our empirical work, followed by the scientific and policy implications of these findings. Finally, we discuss limitations of the current research and suggest potential avenues for future research.

Summary of Empirical Chapters

Chapter 2 investigated whether people expect nudges to harm their autonomy and whether expectations are different for a default versus a social norm nudge. In Study 1, we presented participants with a scenario in which the participant is about to move into a new apartment and has the option to additionally rent up to 14 green amenities, such as low-flow toilets or solar powered outdoor lighting. The scenario either included a default nudge or direct persuasion suggesting to the participant to choose as many amenities as possible or included no persuasion. The persuasion style used was made explicit and explained to the participants. We found that compared to the other two conditions, participants expected the default nudge to harm autonomy. The second study added a social norm nudge to the design of Study 1 and found that while a default nudge led to decreased expectations for autonomy, the social norm nudge did not. This implies that different kinds of nudges have different effects on expected autonomy. In Study 3, we changed the explanation of the persuasion technique to either include (as in Studies 1 and 2) or omit an explanation that nudges often work without the decision maker's awareness. We found that omitting this explanation negated the negative effect on expected autonomy for the default nudge, which suggests that this explanation was the main driver of the negative effects on expected autonomy. Together, the findings of Chapter 2 suggest that laypeople do hold negative expectations for default but not for social norm nudges about their autonomy upon being nudged, given they are provided with information on the nudge's covert nature.

Chapter 3 investigated whether the results on expected autonomy from Chapter 2 translate into experienced autonomy when people are actually confronted with nudges. The chapter describes three online studies. Study 1 aimed to replicate the findings from Chapter 2, namely that people expect default nudges (but not social norm nudges) to harm autonomy. This time, however, we targeted a behavior that could actually be nudged in Study 2 to allow

for measuring experienced autonomy: Participants were asked to imagine that they would participate in a paid 5-minute online study and be asked to voluntarily participate in a study that takes 5 minutes longer, all in order to advance scientific research. The affirmative answer was checked by default in the default condition; in the social norm nudge condition, it was stated that most people choose the affirmative answer.

In Study 1, the results pointed to the same effect as in Chapter 2—that is, that default but not social norm nudges were expected to harm autonomy—however, the results were not statistically significant. In Study 2, participants participated in our 5-minute online study and were asked to voluntarily participate in a study that was 5 minutes longer to help scientific research. The default nudge, but not the social norm nudge, was found to be effective. However, compared to the control condition, autonomy was unaffected in both nudge conditions. In Study 3 we included both a hypothetical nudge and a real nudge condition, replicating Studies 1 and 2 in one and the same study but with a bigger sample size. The results showed that similar to the results from Chapter 1, participants did *expect* the default nudge to harm autonomy, but only if the nudge was pointed out and if its influence was explained. However, participants who were actually nudged did *not experience* decreased autonomy, regardless if the nudge was transparent or non-transparent. The results of Chapter 3 suggest that while participants expected default nudges to harm their autonomy, when actually confronted with this nudge, autonomy remained unaffected. Still, more studies with different types of nudges for a variety of behavior employing different transparency manipulations are needed to determine whether these findings are generalizable; thus, in the subsequent chapter we tested two variations of nudge transparency and their impact on experienced autonomy.

Chapter 4 is a registered report which used the same nudges as Chapter 3. We compared a group of participants who were nudged with a non-transparent default nudge to

two other conditions in which participants were confronted with the same default nudge with varying explanations. In one comparison condition ('purpose condition'), only the purpose of the nudge was explained; in the other comparison condition ('purpose and awareness'), participants were also told that people are usually unaware of the nudge's influence. The study revealed that transparency had no effect on the experience of autonomy. This was likely due to the fact that autonomy was high to begin with, as indicated by the overall high levels of autonomy measured in all three conditions as well as by the findings from Chapter 3. Importantly, all studies from Chapters 2, 3, and 4 focused on hypothetical or relatively low-impact decisions. To obtain a clearer picture and to put our findings that autonomy is not negatively affected by nudges to a more stringent test, in Chapter 5 we investigated post-nudge autonomy in relation to a particularly impactful decision, that of registering as an organ donor.

Chapter 5 tested how nudges relate to autonomy in a high-stakes decision. This Chapter describes an online observational study that made use of a change in Dutch law that altered the organ donor registration system from opt-in to opt-out. All citizens who did not register their choice on organ donation registration were sent a letter urging them to actively register. If they did not do so before the imposed deadline, they would be defaulted into being registered as a donor. The results showed that citizens who registered before the law was changed felt only slightly more autonomous than participants who actively registered after receiving the letter urging them to make a decision and reminding them of the new default. However, citizens who did not actively register after receiving the letter and were defaulted into being a donor experienced much lower autonomy compared to citizens who registered before receiving a letter and citizens who actively registered after receiving a letter. These results imply that even with these high stakes, the impact of the nudge (new default and letter) on experienced autonomy was limited. Rather, autonomy was strongly related to

whether decision makers made a choice themselves or not. Regardless, the results are the first to show that default nudges are related to significantly lower autonomy for specific groups who—for reasons that need to be determined in future studies—may experience difficulties with making decisions.

Overall Findings

In the following, we will discuss the main findings in view of the overall objectives of this dissertation. First, the results on the main research question—whether nudges affect experienced autonomy—are presented. Second, the findings on the effect of nudges on expected autonomy will be discussed, followed by explanation of the effects of transparency on experienced autonomy. Third, we elaborate on the effects of nudges on satisfaction with one's choice, and fourth, the effects of nudges on experienced pressure will be reviewed.

Nudges and experienced autonomy

The main contribution of the current dissertation lies in the investigation of experienced autonomy after being nudged. The results of Chapters 4 and 5 imply that the effect of nudges on the experience of autonomy is minimal. Autonomy was high across all conditions and studies, both compared to the control conditions without nudges and the medium point of the autonomy scale (with the exception of Chapter 5, which will be discussed later). As explained in the introduction of this dissertation, autonomy can be conceptualized in different ways. Vugts and colleagues (2020) distinguish among three conceptualizations: Freedom of Choice, Agency, and Self-Constitution. The studies of the current dissertation measured autonomy via a questionnaire consisting of four statements that bear a strong resemblance with Self-Constitution, as exemplified by items such as 'my decision is compatible with my goals and interest' and 'my decision is definitely an expression of myself'. As the autonomy conceptualizations defined by Vugts and colleagues

(2020) are stated to be hierarchical with Self-Constitution in the top of the hierarchy, people who feel autonomous in the sense of Self-Constitution would also feel autonomous in terms of Freedom of Choice and Agency. Thus, in the context of the autonomy distinctions as defined by Vugts et al. (2020), autonomy in the current dissertation was measured in the most stringent sense.

Nudges and expected autonomy

Next to experienced autonomy, the current dissertation also investigated how autonomous participants *expect* to feel after having been nudged. The results of Chapters 2 and 3 suggest that certain kinds of nudges, specifically default nudges, lead to lower expectations of autonomy, compared to control conditions and social norm nudge conditions. These negative effects are in line with predictions of nudge critics who argue that nudges may harm autonomy (Bovens, 2009; House of Lords, Science, and Technology Select Committee, 2011; Hansen & Jespersen, 2013). Interestingly, negative effects were only found for default nudges and when the effects and the presence of this nudge was explained, specifically when it was explained that people are usually unaware of the nudge. The latter is also the main argument for the alleged negative effect of nudges on autonomy (Bovens, 2009; Hansen & Jespersen, 2013), which suggests that the concerns of laypeople and nudge scholars at least partially overlap insofar it concerns influencing one's choices without being aware of it. It should be emphasized that no effect of nudges on *experienced* autonomy were found, even when participants were told that people are usually unaware of the nudge's influence (Chapter 4).

Nonetheless, nudges' negative impact on *expected* autonomy are concerning on their own. In general, public support for nudges has been shown to be high (Sunstein, Reisch, & Rauber, 2017; Sunstein, Reisch, & Kaiser, 2019), but it might very well be that negative expectations are the main reason for some people to not support certain nudges. This problem

could be addressed by employing a milder type of nudge to soften concerns about autonomy (e.g., by employing social norm nudges instead of default nudges). Additionally, public campaigns could be set up in order to explain that most people do not experience less autonomy after being nudged. Ideally, such campaigns should be backed up by new research showing that nudging might actually improve decision making competency.

Transparency and autonomy

Multiple papers have theorized that nudge transparency may have a positive effect on the decision maker's autonomy (Bovens, 2008; Hansen & Jespersen, 2013; Schmidt & Engelen, 2020). This assumption was tested in Chapters 3 and 4. The results suggest that transparency has no effect on experienced autonomy, neither positive nor negative. While this may be explained by high levels of experienced autonomy to begin with, it would have still been possible that the explanation of a nudge would increase the decision maker's autonomy as they would feel like they would receive more information about factors influencing their decision. We argue that nudges should still be made as transparent as possible, because they increase objective autonomy by giving the decision maker more information on which to base a decision. Additionally, transparency presents other positive effects; for example, in other research it was found that decision makers are more willing to work with the decision designer in the future if the nudge was made transparent (Steffel et al., 2016).

Choice Satisfaction

All studies in the current dissertation measured satisfaction with choice as a concept that might be strongly associated with autonomy. Overall, we found a strong relationship between autonomy and satisfaction, as expected. It was also found that autonomy mediated the effect of nudge exposure on satisfaction. These results suggest that autonomy plays an important role in the decision maker's satisfaction with their choice, supporting the notion described in the introduction of this dissertation that threatened autonomy in repeated

confrontations with the same nudge might lead to a decision maker avoiding the nudged option, as it is associated with low satisfaction.

Pressure

Finally, experienced pressure to choose the nudged option was also measured in all studies. Surprisingly, whereas autonomy and pressure were always strongly negatively correlated, the conditions that experienced the most pressure were not always the conditions that experienced the lowest autonomy (e.g. social norm nudge conditions scored high on pressure, while they also scored high on autonomy). It was expected that experienced pressure would explain lower autonomy, as the pressure might be experienced as a threat to the decision maker's freedom. While this is partially true, as found with mediation analysis in Chapter 2, other, currently unknown factors likely influence whether experienced pressure translates into lower experienced autonomy. More research is needed to understand this relationship.

Implications

In the following section, implications of the current dissertation for research and policy making will be discussed. We will focus on four topics: understanding the consequences of nudging that go beyond immediate behavior; nudging as an umbrella term and the potential to generalize from studies on distinct nudges; distinctions between types of default nudges; and the effect of nudges on vulnerable groups.

Understanding consequences of nudging beyond immediate behavior

The empirical studies in the current dissertation demonstrated that consequences of nudges can be investigated that go beyond immediate behavioral effects. We argue that studies like these are necessary to gain a more profound understanding of the psychology behind nudges, in order to fully comprehend how nudges work and how they affect the

decision maker. As elaborated on earlier, nudges are for instance experienced to be pressuring, but pressure does not always translate into lower expectations of autonomy. Other research has found that participants are more willing to work with the researchers again, if the nudge was made transparent (Steffel et al., 2016). These findings illustrate that there is a high potential to optimize nudges beyond their effectiveness in changing immediate behavior. More empirical research is needed to understand the psychology behind nudging, and our results imply that there is a lot to gain from this understanding.

Nudging as an umbrella term

The results of Chapters 2 and 3 suggest that expectations of how autonomy may be affected differ for different kinds of nudges. Specifically, default nudges and social norm nudges were compared, and were found to yield different effects on autonomy. That is, while experienced pressure was high for both default and social norm nudges, only for default nudges did participants expect their autonomy to be harmed. In Study 3 of Chapter 2, transparent social norm nudges were even found to increase expected autonomy. Findings like these imply that nudging as an umbrella term for different behavior change techniques is an oversimplification that prevents a better understanding of how nudges operate, and that different kinds of nudges work in different ways and pose different consequences for the decision maker. As research on nudging progresses, public policymakers need to be up to date regarding the developments of the nudging literature, and not only be informed about nudging as a whole, but also about the specific nudge they want to implement and how it affects both behavior as well as other downstream consequences.

Distinctions in defaults

The results of the organ donation study, reported in Chapter 5, show that the confrontation with a nudge is not the only factor that is related to the experience of autonomy. It may also matter whether people feel competent to make a decision in the first

place. Although the organ donation study was observational, which means it does not allow for causal conclusions, the results suggest that whether someone actively makes a decision is related to their feeling of autonomy and satisfaction with that choice – and that this relation is potentially bidirectional. This finding highlights an important distinction in defaults that is often overlooked. While both Chapter 4 and 5 included an opt-out default nudge, the way both nudges work may be different. In Chapter 4, we employed a default nudge that presented participants with the pre-selected option to take the long version of a survey. Importantly, however, all participants had to actively confirm their choice, and no condition scored significantly lower on autonomy. In Chapter 5, people were also presented with a pre-selected option to register as an organ donor but in this case no active involvement of their own was required. Interestingly, the group that did not actively make their decision scored significantly lower on autonomy and satisfaction. To our knowledge, there is no research yet on the difference between active and passive defaults. Our results imply that decision makers perceive these types of defaults differently and that passive defaults might have negative effects on certain groups as compared to what we label as active defaults.

Nudges and lack of capacity to act

In 2019, the Dutch Scientific Council for Government Policy (WRR) published the report ‘Why knowing what to do is not enough’ (Keizer, Tiemeijer, & Bovens, 2019), emphasizing the importance to take citizens’ capacity to act into account when designing public policies. The report makes a strong case for the notion that even when citizens possess the mental capacity to think rationally, this does not automatically result in the desired action. Our finding on how people respond to the new organ donation registration arrangement, reported in Chapter 5, attests to this important insight. A significant group of people who received a letter informing them about the new default arrangement in organ donation did not actively register their choice upon this invitation. Whereas this is a concerning finding in its

own right, it is even more troubling that these people did experience significantly lower levels of autonomy than people who responded to the invitation for registration (regardless their specific choice). This finding illustrates the relevance of the WRR report that a lack of capacity to act has negative consequences for citizens. The council advises the use of nudges protect the self-reliance of citizens with low capacity to act. However, the results of Chapter 5 show that even when a nudge is used, low capacity to act may result in negative consequences for some people, implying that nudges are not a silver bullet to resolve the issue of low capacity to act. Importantly, future research should examine what kind of nudges may help to restore the capacity to act and support this group in making decisions in the first place. The report of the council also points out that low capacity to act is not simply a consequence of low capacity to think, but can for example be a result of stressful life events like divorce, debt, or other stressors. More research is needed to understand this vulnerable group, how they respond to nudges and why, and how, in particularly for them, negative consequences for autonomy and satisfaction can be avoided.

Limitations

While the current dissertation produced valuable new insights, a number of limitations deserve mentioning.

Generalizability

While some studies included social norm nudges, the main focus in the current studies was on default nudges. Default nudges are highly relevant as they are both frequently used and also highly effective (Jachimowicz et al., 2019). However, due to the limited use of other kinds of nudges, results of the current dissertation are limited in their generalizability. More research on other kinds of nudges is needed to evaluate whether the implications of the current dissertation hold true for nudges in general.

Validity

Furthermore, all studies involved one-time nudges: Experiments with repeated presentations of the nudge (e.g., when people are exposed to nudges aiming to influence day-to-day dietary or travel decisions) are needed to understand the consequences of harmed autonomy on subsequent decision making. Similarly, all studies were done online, which is where some real life decisions indeed happen. However, more field experiments are needed to see how people experience autonomy when exposed to nudges in their everyday life.

Low-stakes versus high-stakes

Finally, most studies used low-stakes nudges. Chapter 5 did investigate a high-stakes nudge. However, this was an observational survey study, making it difficult to disentangle the role of the nudge and the role of active decision making in their impact on experienced autonomy. Given that the largest differences in autonomy were found in this study, more experiments with different behaviors in low- and high-stakes decisions are needed to better understand the effects of nudges on autonomy.

Future Research

The current dissertation offers promising avenues for future research. Below I will describe four potential avenues that follow directly or indirectly from the research presented in this dissertation.

Differences between nudges

Following the limitations highlighted above, future research should investigate whether the findings of this dissertation are generalizable to other kinds of nudges. In Chapter 2, it was found that a transparent social norm nudge increased expected autonomy compared to the control group. This is intriguing, as it suggests that while some nudges, like defaults, can harm expected autonomy, other kinds might increase feelings of autonomy. This notion is

in agreement with the argumentation of philosopher Luc Bovens (2009) that nudges might harm autonomy by making the decision maker base their decision on irrelevant reasons, such as inertia from exposure to a default. Whereas a default might lead to people making a choice for trivial reasons (such as inertia), social norm nudges might not be perceived as autonomy threatening because decision maker's find information on what other people choose to be relevant. Future research could investigate whether the relevance of reasons is a good guide to identify nudges that may promote autonomy by providing cues that are relevant to the decision maker.

Repeated decision making

Future research should also investigate the effect of repeated nudges on autonomy. Many areas in which nudges are used rely on repeated encounters with nudges, including, for example, recycling and dietary behavior. Research questions of interest might be whether expectations of autonomy change after having encountered the nudge only once or more often, and whether the experience of autonomy during a nudge encounter in the past predicts one's choice in the future. It is also of interest to investigate how autonomy and behavior are affected if the nudge was present at first but is absent for future decisions for the same behavior. Nudge transparency might also play a crucial role in repeated nudge encounters. Transparency might give decision makers the opportunity to link their experience of autonomy and satisfaction to the presence of the nudge, and therefore the chance to adjust expectations for the effects of nudges. This would be less likely with non-transparent nudges, as the decision maker is likely to remain unaware of the nudge.

The psychology behind nudging

As earlier literature has pointed out, more knowledge is needed on psychology behind nudges (Marchiori, Adriaanse, & De Ridder, 2017), through which mechanisms they work, and how this affects the decision maker. In the current dissertation, exploratory measures

relating to the psychology of nudging were examined, including experienced pressure, feeling of competence in decision making, and acceptance of the nudge. The results show that all these variables are related to autonomy, but especially in the case of pressure, other factors seem to influence the relationship with autonomy. Again, more research is needed here to understand the downstream consequences of nudges.

Philosophical approach

As stated earlier, concerns about nudges harming autonomy have been primarily voiced by scholars from philosophy, based on notions relating to objective autonomy. Our psychological research did not directly address these notions but focused on subjective or experienced autonomy instead. Notwithstanding this different focus, we feel that our findings are relevant to philosophical approaches to nudges as well. Now that empirical research shows that harm to experienced autonomy from nudges in low-stakes situations seems to be small, ethical arguments against the use of nudges should be reassessed. What does it mean for the ethics of nudges if they do not harm experienced autonomy? Does that mean nudges can be freely used in low-stakes situations, or are concern about objective autonomy still relevant? In a similar vein, our findings point to the need of reexamining transparency of nudges. It has been argued that transparency would improve the decision maker's autonomy (Bovens, 2009; Hansen & Jespersen, 2013). However, in view of our findings that nudge transparency does not contribute to the experience of autonomy, it should be reassessed whether and how transparency affects the ethics of nudge.

Conclusion

The empirical studies in the current dissertation aimed to answer whether nudges are harmful to autonomy and how this potential harm could be mitigated. A specific focus lied on the difference between expected and experienced autonomy. Our results show that nudges

may compromise expectations of feeling autonomous after nudge exposure, but that this effect depends on the specific type of nudge. This finding warrants careful consideration of what kind of nudge may reduce concerns over expected threats to autonomy. Regarding experienced autonomy, no negative effects of default nudges were found in low-stakes situations; furthermore, no positive effect of transparency on experienced autonomy was found. These results imply that concerns about the experience of autonomy after being nudged are likely misconceptions. Yet, in high-stakes situations, defaults might be harmful to individuals with low capacity to act. As expected, the decision makers' satisfaction with their choice is closely related to their autonomy. Similarly, the level of pressure decision makers experience is closely related to their autonomy; however, other factors are likely interacting with this relationship. The current dissertation offers initial understanding of the effects of nudges on autonomy and illuminates new, promising directions for future research, both empirical and theoretical.

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Supplementary Materials

Chapter 2

Additional Mediation Analyses Study 1

We used mediation analysis (MacKinnon, Fairchild, & Fritz, 2007) to test whether experienced pressure explains the effect of condition (nudge versus control) on autonomy. As can be seen in Figure 1, pressure partially mediated the effect of condition on autonomy.

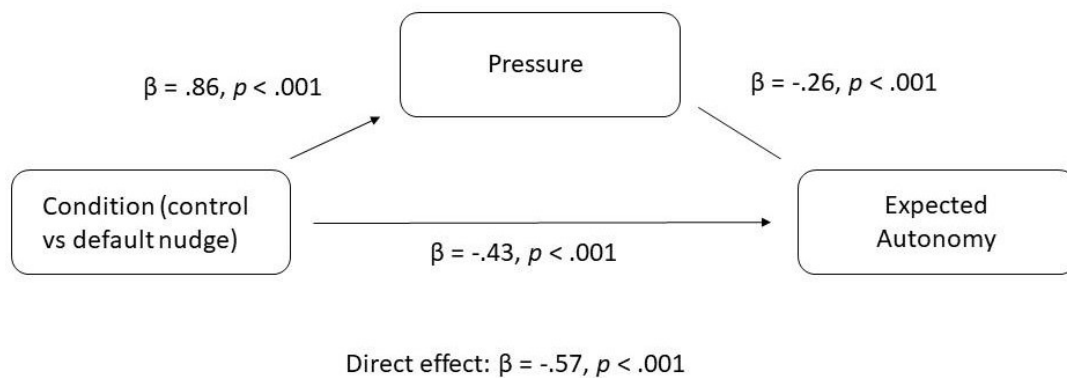


Figure S2.1. Mediation of Pressure of the Effect of Condition (control vs default nudge condition) on Expected Autonomy in Study 1.

We also used mediation analysis to test whether autonomy mediates the effect of condition (control vs default nudge) on satisfaction. As can be seen in Figure 2, autonomy partially mediated the relation between condition and expected satisfaction.

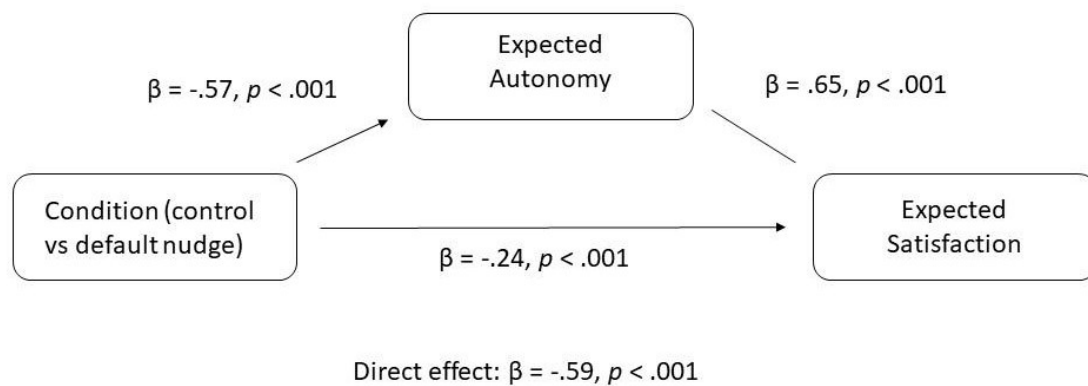


Figure S2.2. Mediation of Expected Autonomy of the Effect of Condition (control vs default nudge condition) on Expected Satisfaction in Study 1.

Additional Mediation Analyses Study 2

We then used mediation analysis to test whether pressure mediates the effect of condition (control vs default nudge) on expected autonomy. As can be seen in Figure 3, pressure partially mediated the effect of condition on expected autonomy.

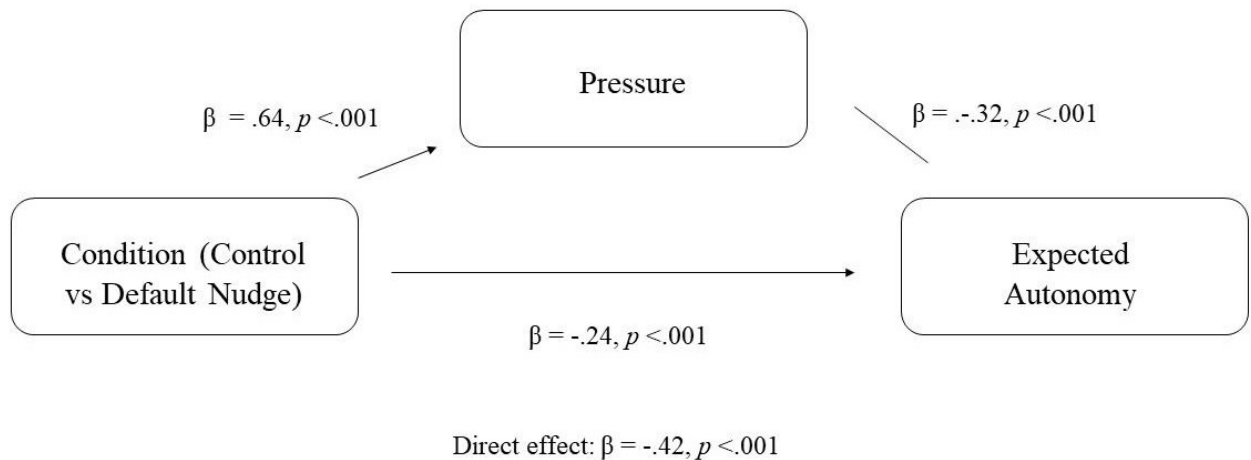


Figure S2.3. Mediation of Pressure of the Effect of Condition (control vs default nudge condition) on Expected Autonomy in Study 2.

We also used mediation analysis to test whether pressure mediates the effect of condition (default nudge vs social norm nudge) on autonomy. As can be seen in Figure 4, pressure partially mediated the effect of condition on expected autonomy.

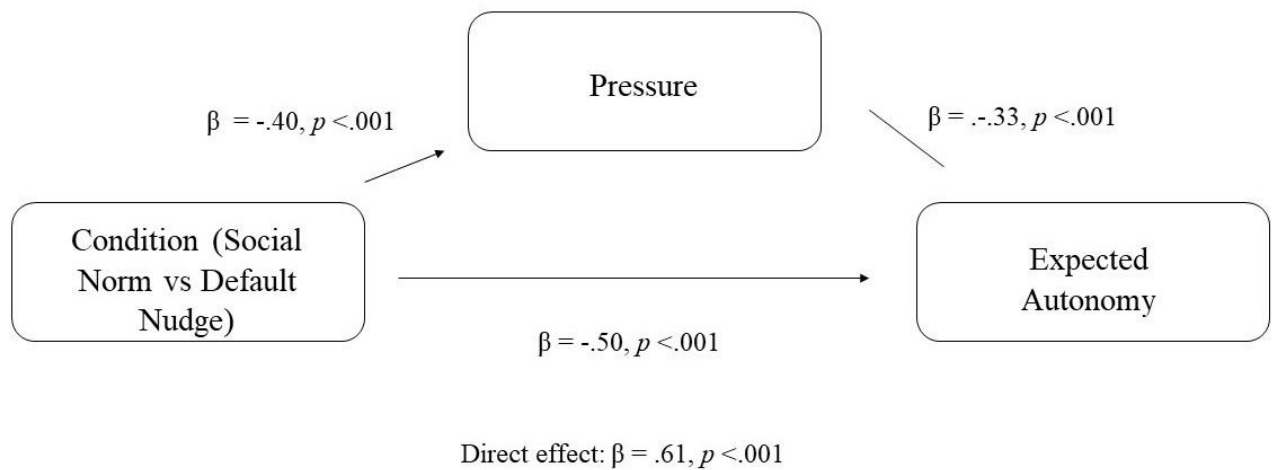


Figure S2.4. Mediation of Pressure of the Effect of Condition (social norm nudge vs default nudge condition) on Expected Autonomy in Study 2.

We then used mediation analysis to test whether autonomy mediates the effect of condition (control vs default nudge) on satisfaction. As can be seen in Figure 5, expected autonomy partially mediated the effect of condition on expected satisfaction.

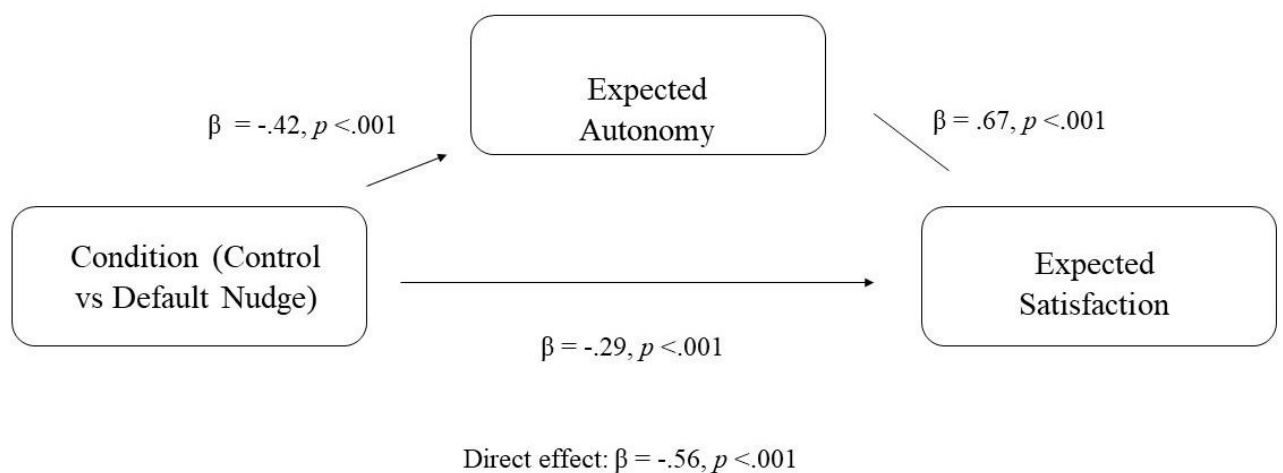


Figure S2.5. Mediation of Expected Autonomy of the Effect of Condition (control vs default nudge condition) on Expected Satisfaction in Study 2.

We also used mediation analysis to test whether autonomy mediates the effect of condition (default nudge vs social norm nudge) on satisfaction. As can be seen in Figure 6, expected autonomy partially mediated the effect of condition on expected satisfaction.

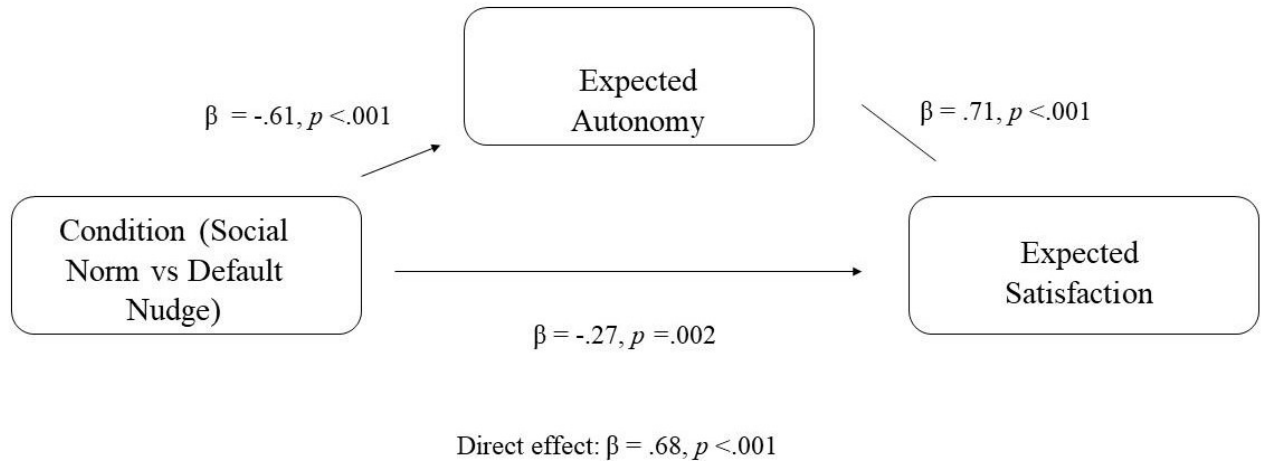


Figure S2.6. Mediation of Expected Autonomy of the Effect of Condition (social norm nudge vs default nudge condition) on Expected Satisfaction in Study 2.

Additional Mediation Analyses Study 3

We then used mediation analysis to test whether pressure mediates the effect of condition (control vs default nudge) on autonomy. As can be seen in Figure 7, pressure partially mediated the effect of condition on expected autonomy.

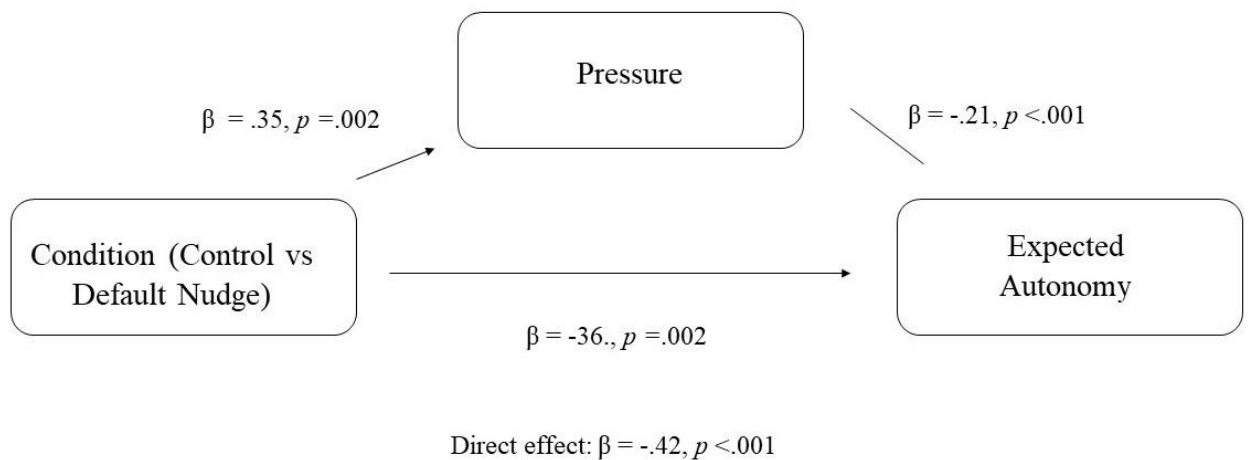


Figure S2.7. Mediation of Pressure of the Effect of Condition (control vs default nudge condition) on Expected Autonomy in Study 3.

We also used mediation analysis to test whether pressure mediates the effect of condition (default nudge vs social norm nudge) on autonomy. As can be seen in Figure 8, pressure partially mediated the effect of condition on expected autonomy.

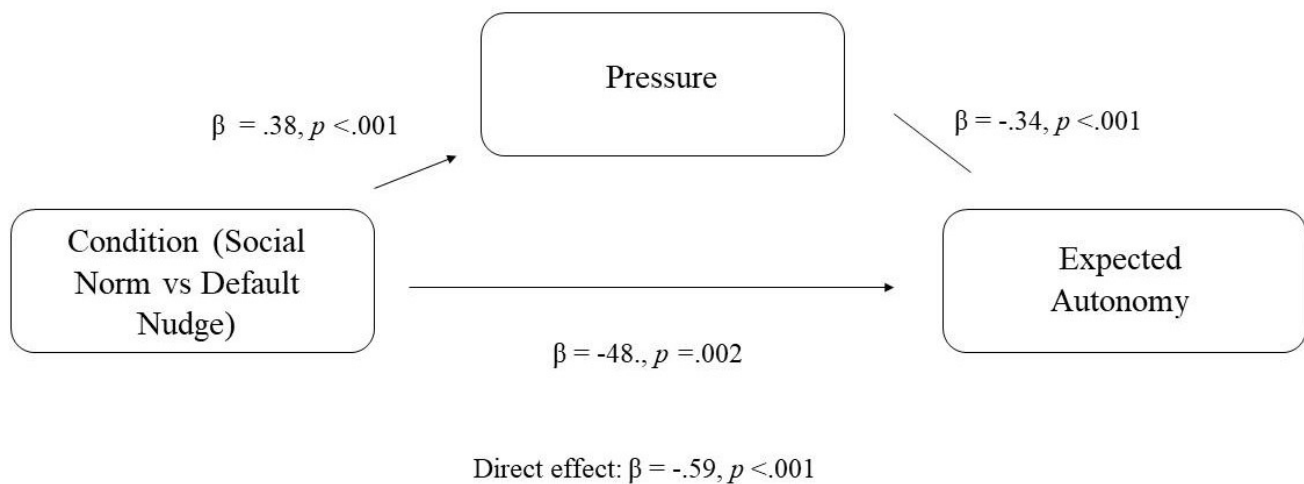


Figure S2.8. Mediation of Pressure of the Effect of Condition (social norm nudge vs default nudge condition) on Expected Autonomy in Study 3.

We then used mediation analysis to test whether autonomy mediates the effect of condition (control vs default nudge) on satisfaction. As can be seen in Figure 9, expected autonomy partially mediated the effect of condition on expected satisfaction.

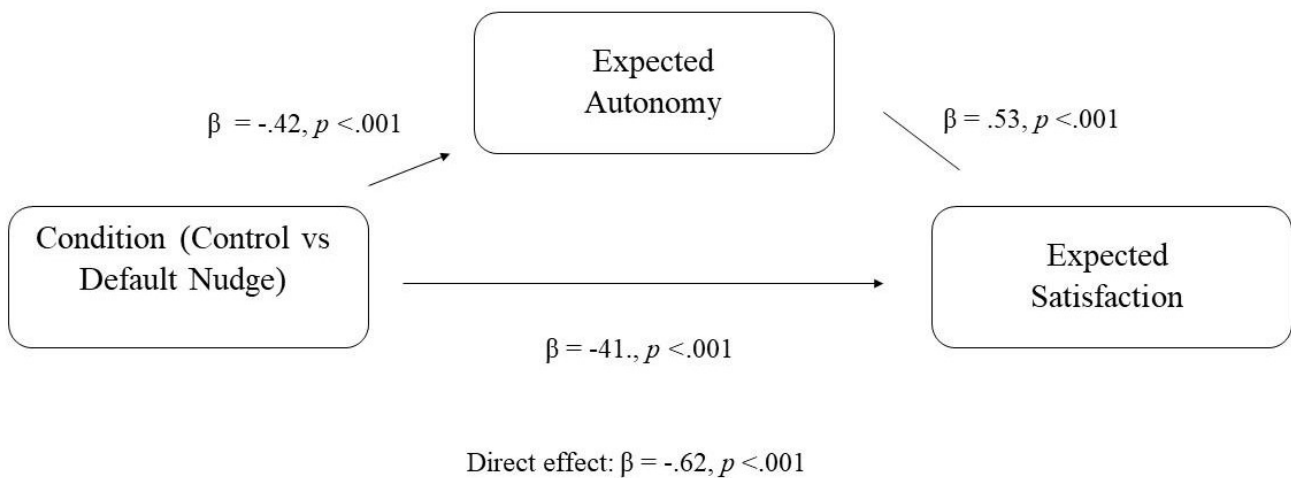


Figure S2.9. Mediation of Expected Autonomy of the Effect of Condition (control vs default nudge condition) on Expected Satisfaction in Study 3.

We then used mediation analysis to test whether autonomy mediates the effect of condition (default nudge vs social norm nudge) on satisfaction. As can be seen in Figure 10, expected autonomy partially mediated the effect of condition on expected satisfaction.

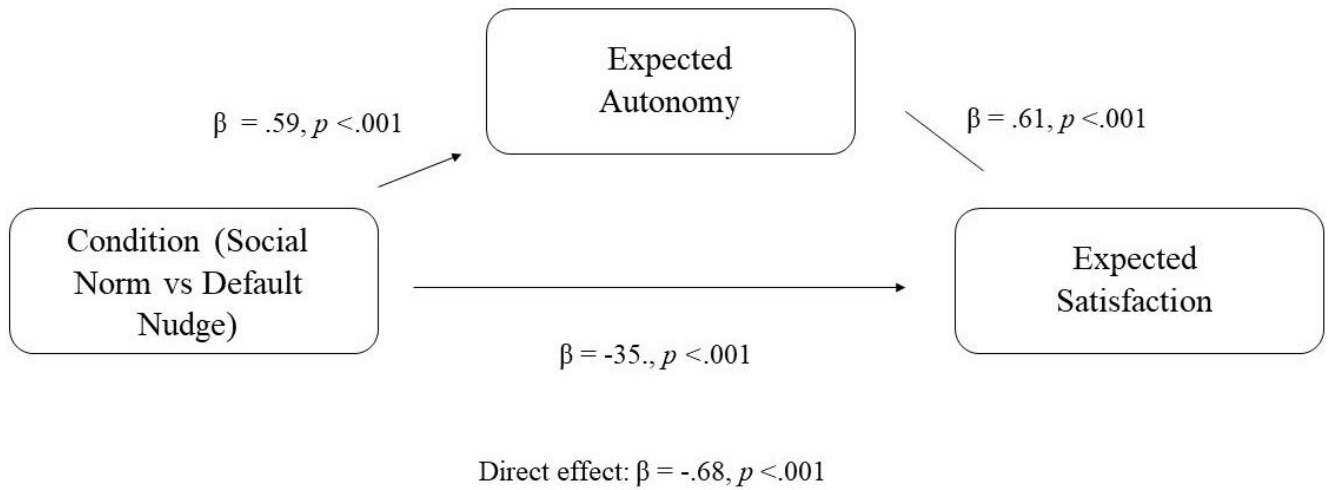


Figure S2.10 Mediation of Expected Autonomy of the Effect of Condition (social norm nudge vs default nudge condition) on Expected Satisfaction in Study 3.

- Green Amenities**
- Energy Star furnace and air conditioner
 - Tankless water heater
 - Programmable thermostat
 - Storm windows and doors
 - Airflow-adjusting ceiling fans
 - UV-filter film on windows
 - Energy-efficient dishwasher and refrigerator
 - Compact fluorescent light bulbs
 - Energy-efficient washer and dryer
 - Dimmer switches for indoor lighting
 - Low-flow toilets
 - Solar-powered outdoor lighting
 - Low-flow faucets and shower heads
 - Motion sensors for outdoor lighting

Figure S2.11. List of amenities, as seen by the control condition in Study 1.

Green Amenities

- Energy Star furnace and air conditioner
- Tankless water heater
- Programmable thermostat
- Storm windows and doors
- Airflow-adjusting ceiling fans
- UV-filter film on windows
- Energy-efficient dishwasher and refrigerator
- Compact fluorescent light bulbs
- Energy-efficient washer and dryer
- Dimmer switches for indoor lighting
- Low-flow toilets
- Solar-powered outdoor lighting
- Low-flow faucets and shower heads
- Motion sensors for outdoor lighting

Figure S2.12. List of amenities, as seen by the default nudge condition in Study 1.

Green Amenities

Please think of the environment and select as many amenities as possible!

- Energy Star furnace and air conditioner
- Tankless water heater
- Programmable thermostat
- Storm windows and doors
- Airflow-adjusting ceiling fans
- UV-filter film on windows
- Energy-efficient dishwasher and refrigerator
- Compact fluorescent light bulbs
- Energy-efficient washer and dryer
- Dimmer switches for indoor lighting
- Low-flow toilets
- Solar-powered outdoor lighting
- Low-flow faucets and shower heads
- Motion sensors for outdoor lighting

Figure S2.13. List of amenities, as seen by the direct persuasion condition in Study 1.

Imagine you are a student who just moved to a new flat in a new neighbourhood. Your monthly income is 800€. There are two possible contracts for you to choose from the local energy supplier. Please act as if real money was involved.

Usually, you spend your budget in the following way:

- Flat and utility bill: 330
- Alimentation: 160
- Clothing: 50
- Study materials: 30
- Transportation: 75
- Insurance and Medicine: 60
- Communication: 35
- Leisure: 60

Choose one of the following contracts:

- Contract A: 100% conventional energy, priced at 30€ per month.
- Contract B: 50% renewable energy / 50% conventional energy, priced at 45€ per month.

Figure S2.14. Electricity scenario, as seen by the control condition in Study 2 and 3.

Imagine you are a student who just moved to a new flat in a new neighbourhood. Your monthly income is 800€. There are two possible contracts for you to choose from the local energy supplier. Please act as if real money was involved.

Usually, you spend your budget in the following way:

- Flat and utility bill: 330
- Alimentation: 160
- Clothing: 50
- Study materials: 30
- Transportation: 75
- Insurance and Medicine: 60
- Communication: 35
- Leisure: 60

Choose one of the following contracts:

- Contract A: 100% conventional energy, priced at 30€ per month.
- Contract B: 50% renewable energy / 50% conventional energy, priced at 45€ per month.

Figure S2.15. Electricity scenario, as seen by the default nudge condition in Study 2 and 3.

Imagine you are a student who just moved to a new flat in a new neighbourhood. Your monthly income is 800€. There are two possible contracts for you to choose from the local energy supplier. Please act as if real money was involved.

Usually, you spend your budget in the following way:

- Flat and utility bill: 330
- Alimentation: 160
- Clothing: 50
- Study materials: 30
- Transportation: 75
- Insurance and Medicine: 60
- Communication: 35
- Leisure: 60

Please think of the environment and select the contract consisting of 50% renewable energy, if possible.

Choose one of the following contracts:

- Contract A: 100% conventional energy, priced at 30€ per month.
- Contract B: 50% renewable energy / 50% conventional energy, priced at 45€ per month.

Figure S2.15. Electricity scenario, as seen by the direct persuasion condition in Study 2 and 3.

Imagine you are a student who just moved to a new flat in a new neighbourhood. Your monthly income is 800€. There are two possible contracts for you to choose from the local energy supplier. Please act as if real money was involved.

Usually, you spend your budget in the following way:

- Flat and utility bill: 330
- Alimentation: 160
- Clothing: 50
- Study materials: 30
- Transportation: 75
- Insurance and Medicine: 60
- Communication: 35
- Leisure: 60

From your local energy provider you receive the information that the majority of your neighbours uses an energy mix that features 50% renewable energy.

Choose one of the following contracts:

- Contract A: 100% conventional energy, priced at 30€ per month.
- Contract B: 50% renewable energy / 50% conventional energy, priced at 45€ per month.

Figure S2.16. Electricity scenario, as seen by the social norm nudge condition in Study 2 and 3.

Chapter 3

Results

Descriptives

In the initial sample of 905 participants, thus including people who failed the manipulation check, 374 (41.3%) were female. The sample has a mean age of 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 showed no significant differences between conditions in terms of age or sex (all $ps \geq .382$).

See table 1 for a correlation matrix.

Nudge Effectiveness

Similar to the analyses in the main article, but with the initial sample, instead of the cleaned one, 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 (48.3%), the purpose condition (54.5%) and the purpose & unaware condition (52.6%) did not differ significantly from each other with regard to how often the nudged option was chosen (all $ps \geq .132$). 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 & unaware condition to score lower on autonomy and satisfaction and higher for pressure compared to the control condition. We conducted three ANOVAs, this time with the initial sample, with autonomy, satisfaction and pressure as the dependent variable respectively, and condition as the independent variable.

Table S3.1

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. autonomy	5.29	1.02							
2. satisfaction	5.18	0.67	.45** [.39, .50]						
3. pressure	30.25	29.02	-.16** [-.23, -.10]	-.05 [-.12, .01]					
4. choice	0.52	0.50	.18** [.11, .24]	.02 [-.04, .09]	-.20** [-.26, -.13]				
5. sign-up list	0.89	0.32	.06 [-.00, .13]	-.01 [-.07, .06]	.00 [-.06, .07]	.16** [.10, .22]			
6. age	27.66	9.96	.05 [-.02, .11]	.09** [.03, .16]	-.10** [-.16, -.04]	.14** [.08, .20]	-.06 [-.12, .01]		
7. sex	1.42	0.50	.02 [-.04, .09]	.18** [.11, .24]	.03 [-.04, .09]	.08* [.01, .14]	-.02 [-.08, .05]	.15** [.09, .22]	
8. manipulation check	1.70	0.46	-.06 [-.12, .01]	-.02 [-.09, .04]	.10** [.04, .17]	.00 [-.06, .07]	-.07* [-.13, -.00]	-.08* [-.14, -.01]	-.01 [-.07, .06]

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 $p < .01$.

For autonomy, we found no significant difference between the control condition ($M = 5.26$, $SD = 0.96$), the purpose condition ($M = 5.22$, $SD = 1.03$), and the purpose & unaware condition ($M = 5.39$, $SD = 1.06$) $F(2,902) = 2.41$, $p = .094$. The same is true for satisfaction, where the control condition ($M = 5.59$, $SD = 0.86$), the purpose condition ($M = 5.60$, $SD = 0.94$), and the purpose & unaware condition ($M = 5.66$, $SD = 0.91$) did also not differ significantly $F(2,902) = 0.512$, $p = .599$. For pressure, again we found no significant differences between the control condition ($M = 30.54$, $SD = 29.15$), the purpose condition (M

= 29.56, $SD = 27.93$), and the purpose & unaware condition ($M = 30.64$, $SD = 30.03$) did not differ on pressure $F(2,902) = 0.126$, $p = .882$. All three variables behaved against our hypothesis that the purpose condition would score the most favorable, and the purpose & unaware the most in favorable.

Notification List

Similar to the analysis described in the paper, but conducted with the initial sample instead of the cleaned one, a logistic regression with notification sign-up as the dependent variable and condition as the independent variable, showed, that the control condition (88.4%), the purpose condition (86.7%), and the purpose & unaware condition (91.06%) did not differ in their sign-up rate (all $ps \geq .091$). 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 will not conduct a mediation analysis, as was proposed in the analysis plan.

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. This time on the initial sample, and not the cleaned one. Three of the four ANOVAs showed no significant differences between the conditions (all $ps \geq .219$). However, scores on the fourth item ('I feel very strongly that I had the opportunity to have influence on my decision.') of the autonomy scale differed marginally between the three conditions $F(2,902) = 2.774$, $p = 0.063$. A Tukey HSD post hoc test, however, also only showed a marginally significant difference between the control condition ($M = 5.53$, $SD = 1.29$) and the purpose & unaware condition ($M = 5.77$, $SD = 1.16$, $p = .088$).

Similarly, we conducted five ANOVAs to test the individual items of the satisfaction questionnaire, this time with the initial sample and not the cleaned one, as we did in the article. While the four of the items did not significantly differ between the conditions (all p s $\geq .118$), the conditions did marginally significantly differ on the second item ('I am comfortable with my decision.') $F(2,902) = 2.672, p = .070$. A Tukey HSD post hoc test, however, showed that the unaware & purpose condition ($M = 5.99, SD = 1.07$) and the control condition ($M = 5.81, SD = 1.24$) did not significantly differ, but also only differed marginally ($p = .085$).

Online Survey

Graphic S3.1. *Page 1 of the online survey: Consent form and Prolific ID.*



Thank you for participating in this study of Utrecht University. This survey takes about 5 minutes. You can, at any time, stop the questionnaire without stating any reason. Your responses are completely anonymous and cannot be traced back to you in any way. All anonymous data collected in this research project will be made public for further research and analyses.

For further questions you can contact the researcher at j.wachner@uu.nl.

I read, and agree with, the text above and want to continue.

Please enter your Prolific ID



Graphic S3.2. *Page 2 of the online survey: Demographic data.*



Please enter your age

Please indicate your sex

Male

Female

Other

Please indicate your nationality



Graphic S3.3. *Page 3 of the online survey: Nudged question (purpose & unaware condition).*



Universiteit Utrecht

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.

-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.-

Longer Version

Normal Version



Graphic S3.4. Page 4 of the online survey: *Autonomy questionnaire*.



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

	Strongly disagree	disagree	somewhat disagree	neither agree nor disagree	somewhat agree	agree	strongly agree
My decision is highly compatible with my goals and interests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel very strongly that my decision perfectly fits my taste.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that my decision is definitely an expression of myself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel very strongly that I had the opportunity to have influence on my decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Graphic S3.5. *Page 5 of the online survey: Satisfaction questionnaire.*

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

	Strongly disagree	disagree	somewhat disagree	neither agree nor disagree	somewhat agree	agree	strongly agree
My decision is sound.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am comfortable with my decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My decision is the right one for my situation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied with my decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It was difficult to make a choice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Graphic S3.6. *Page 6 of the online survey: Pressure scale.*



How much pressure have you felt to choose the longer version of the questionnaire?

None at all
0

Extreme Pressure
100



Graphic S3.7. Page 7 of the online survey: Notification list measure.



Would you like to sign up for our notification list? Prolific will then notify you whenever we post a new survey.



Graphic S3.8. *Page 8 of the online survey: Manipulation check.*

Which of these statements did we make when we asked you earlier:

'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.'

'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.'

'Please note the preselected default option. It is meant to encourage people to choose the longer version of this questionnaire.'

None of the above.

Graphic S3.9. *Page 9 of the online survey: Debriefing.*

This is the end of the study. We want to inform you that your answer to the length of the questionnaire did not affect the length of the questionnaire. We asked the question to see how the presentation of it influences participants' answer.

Thank you for your participation!

For any further questions you can contact j.wachner@uu.nl.



Chapter 4

Hypotheses

We hypothesized experienced pressure and feeling commanded to be higher in each of the nudge conditions, compared to the control condition.

Methods

Decision-making competence questionnaire. Participants' expected competence was measured with a questionnaire consisting of six statements (e.g., "I think I am pretty good at making these kinds of decisions."), which were rated on five-point scales ("strongly disagree" to "strongly agree"). The five scores were averaged to one competence score with acceptable reliability (Cronbach's $\alpha = .78$).

Pressure. Participants were asked in all three studies how much pressure they (expected to) experience to select 'Longer Version' as their answer. Participants could answer on a slider ranging from 0 (None at all) to 100 (Extreme Pressure).

Commandingness. Participants rated how commanding they thought the question to be ("Would you describe the question about the length of the questionnaire to be demanding in a dominant way?") on a slider ranging from 0 (Not dominant at all) to 100 (Very dominant).

Results

Table S4.1

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Autonomy	3.85	0.67						
2. Satisfaction	4.02	0.61	.59** [.53, .65]					
3. Competence	3.70	0.60	.57** [.50, .63]	.58** [.51, .63]				
4. Pressure	33.99	29.82	-.24** [-.33, -.15]	-.28** [-.37, -.20]	-.24** [-.33, -.15]			
5. Dominance	36.10	27.29	-.11* [-.20, -.02]	-.22** [-.31, -.13]	-.10* [-.19, -.01]	.46** [.39, .53]		
6. Age	29.58	10.48	.01 [-.08, .10]	.10* [.01, .19]	.14** [.05, .23]	-.08 [-.17, .01]	-.12* [-.21, -.03]	
7. Sex	0.47	0.51	.04 [-.05, .13]	.09 [-.01, .18]	.04 [-.05, .13]	.05 [-.04, .15]	-.06 [-.15, .04]	.13** [.04, .22]

Note. Correlation Matrix for descriptive data from Study 1. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$.

Competence

We conducted an ANOVA with competence as the dependent variable and condition as the independent variable. No significant effect of condition on competence was found, $F(2,448) = 2.00, p = .140$.

Pressure and Commandingness

We conducted a MANOVA with pressure and commandingness as the dependent, and condition as the independent variable. The multivariate effect was significant Wilk's $\Lambda = .943, F(2, 448) = 6.70, p < .001$. The univariate tests show no significant effect on pressure

$F(2, 448) = 2.73, p = .066$, but show a significant effect on commandingness $F(2, 448) = 12.8, p < .001$.

A post-hoc Tukey HSD test on pressure showed a marginal difference between the social norm nudge ($M = 37.59, SD = 29.54$) and control condition ($M = 29.67, SD = 30.41, p = .055$). No significant effects were found between the default nudge ($M = 34.69, SD = 29.17$) and control condition ($p = .311$) and the default and social norm condition ($p = .674$).

A second post-hoc Tukey HSD test on commandingness showed that the control condition ($M = 27.15, SD = 25.51$) scored significantly lower than both the default nudge condition ($M = 41.35, SD = 28.05, p < .001, d = -.53$) and the social norm nudge condition ($M = 39.76, SD = 26.19, p < .001, d = -.49$). The default and social norm condition did not differ significantly ($p = .860$).

Discussion

We found no support for our hypotheses that participants in the default nudge condition expect to feel less competent than participants in the control condition, and that participants in the social norm nudge condition expect to feel more competent compared to the control condition, as we found no differences in expected competence between any of the conditions.

Our hypothesis that the nudge conditions score higher on pressure than the control conditions was not supported. However, similar to the findings for autonomy from the main article, the differences that we found, while not significant, showed a clear trend in the expected direction. The same hypothesis for commandingness was partially supported, as the both nudge scored higher than the control condition.

Supplementary Materials Study 2

Materials

The materials were mostly the same, except the secondary measure commandingness was replaced by the secondary measures of care and doubt.

Doubt

Doubt was measured with one question: ‘Did you doubt that your answer would alter the survey’s length?’. Participants answered on a slider ranging from 0 (‘Not at all’) to 100 (‘Very much’).

Care

Care was also measured with one question: “How carefully did you decide? “ (referring to the question concerning the length of the questionnaire). Participants answered on a scale from 0 to 100 with the same labels as the doubt measure.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Choice	0.51	0.50								
2. Autonomy	3.83	0.65	.12* [.03, .21]							
3. Satisfaction	4.12	0.57	.13** [.04, .22]	.42** [.34, .49]						
4. Competence	3.67	0.57	.11* [.02, .20]	.52** [.45, .58]	.56** [.50, .62]					
5. Pressure	32.08	28.56	-.21** [-.29, -.12]	-.26** [-.34, -.17]	-.29** [-.37, -.21]	-.25** [-.34, -.16]				
6. Care	63.66	26.71	.00 [-.09, .09]	.21** [.12, .30]	.16** [.07, .25]	.15** [.06, .24]	.04 [-.06, .13]			
7. Doubt	37.54	32.02	-.21** [-.29, -.12]	-.11* [-.20, -.02]	-.18** [-.26, -.08]	-.08 [-.17, .02]	.32** [.24, .40]	.08 [-.01, .17]		
8. Age	29.17	9.58	.19** [.10, .28]	.09 [-.00, .18]	.08 [-.01, .17]	.14** [.05, .23]	-.12* [-.21, -.03]	.05 [-.05, .14]	-.08 [-.17, .02]	
9. Sex	0.50	0.50	.17** [.07, .25]	-.03 [-.12, .06]	.07 [-.02, .16]	.09 [-.00, .18]	.00 [-.09, .10]	-.04 [-.13, .05]	-.05 [-.14, .05]	.08 [-.01, .17]

Table S4.2

Means, standard deviations, and correlations with confidence intervals

Note. Correlation Matrix for descriptive data from Study 2. *M* and *SD* are used to represent mean and standard deviation, respectively.

Results

Condition and Choice on Autonomy and Satisfaction

We investigated whether condition and choice had an interactive effect on autonomy and satisfaction. We conducted a MANOVA with autonomy and satisfaction as the dependent, and condition and choice as the independent variables. We found no univariate multivariate effect of condition Wilk's $\Lambda = .994$, $F(4, 892) = 0.716$, $p = .581$, but we did find a significant effect of choice Wilk's $\Lambda = .979$, $F(2, 446) = 4.863$, $p = .009$. Finally, the interaction term of condition and choice had no significant effect Wilk's $\Lambda = .984$, $F(4, 892) = 1.786$, $p = .130$.

Competence

We conducted an ANOVA with competence as the dependent variable and condition as the independent variable, which resulted in no effect of condition on competence $F(2,450) = 0.05$, $p = .960$.

Pressure, Care, and Doubt

Given that pressure and doubt were correlated, we analyzed both in one MANOVA, with condition as the independent variable. The multivariate effect was not significant Wilk's $\Lambda = .993$, $F(2, 450) = 0.769$, $p = .546$.

We also conducted an ANOVA with care as the dependent variable and condition as the independent variable. The effect was not significant $F(2,450) = 0.21$, $p = .810$.

Supplementary Materials Study 3 Materials

Acceptance

Acceptance was measured by asking participants in the choice nudge conditions how acceptable it was for the researchers to pre-select the answer 'Longer Version' in order to promote this choice. Participants in the choice nudge condition without explanation, who had not yet received an explanation of the nudge, were presented with it next to the acceptance question. Acceptance was measured on a slider ranging from 0 ("Very Unacceptable") to 100 ("Fully Acceptable"). This measure was exploratory and not pre-registered. Analyses on acceptance can be found in the supplementary materials.

Hypotheses

Besides the planned contrasts, hypothesis three (3) predicts that pressure will correlate negatively with both autonomy and satisfaction across all conditions without an explanation, while there will be no correlations in conditions where the nudge is explained. Such a finding would support the idea that explaining the nudge would give the experienced pressure context and not be perceived as autonomy threatening, leading to no harm to one's satisfaction. This will be tested by calculating four correlations, two for autonomy and pressure, two for satisfaction and pressure, one for conditions without explanation, and one for conditions with an explanation.

Results

Table S4.3

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Autonomy	3.88	0.67					
2. Satisfaction	4.05	0.62	.53** [.49, .56]				
3. Competence	3.70	0.59	.53** [.49, .56]	.58** [.54, .62]			
4. Pressure	31.19	28.68	-.26** [-.31, -.21]	-.30** [-.35, -.25]	-.28** [-.33, -.23]		
5. Age	28.11	9.56	.04 [-.01, .09]	.08** [.03, .13]	.11** [.06, .16]	-.04 [-.10, .01]	
6. Sex	0.48	0.50	.04 [-.02, .09]	.09** [.04, .14]	.11** [.06, .17]	-.00 [-.05, .05]	.16** [.11, .21]

Note. Correlation Matrix of the initial data from Study 3. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * indicates $p < .05$. ** indicates $p < .01$.

Condition and Choice on Autonomy and Satisfaction

Choice Conditions. We investigated whether condition and choice had an interactive effect on autonomy and satisfaction. We conducted a MANOVA with autonomy and satisfaction as the dependent, and condition and choice as the independent variables. We found no univariate multivariate effect of condition Wilk's $\Lambda = .997$, $F(4, 1310) = 0.450$, $p = .770$, but we did find a significant effect of choice Wilk's $\Lambda = .952$, $F(2, 655) = 16.45$, $p < .001$. Finally, the interaction term of condition and choice had no significant effect Wilk's $\Lambda = .990$, $F(4, 1310) = 1.730$, $p = .140$.

Aftereffects of Nudging: Competence

Choice Conditions. In order to test hypothesis one, we conducted an ANOVA with competence as the dependent variables and the choice condition (CC- / CN- / CN+) as the independent variable. No effect of condition on competence was found $F(2/659) = 1.04, p = .360$.

Similarly, we conducted an ANOVA with hypothetical condition (HC-, HN-, HN+) as the independent variable. Similarly, we found no effects on hypothetical condition on competence $F(2/657) = 1.58, p = .210$.

Nudge Explanation and Realism on Pressure

Nudge conditions. We decided to also investigate whether an explanation leads to higher experienced pressure. Therefore, we conducted an ANOVA on data of only the nudge conditions (i.e. without hypothetical control condition and choice control condition). Pressure was set as the dependent variable, explanation (with explanation/without explanation), realism (hypothetical/choice), and their interaction term was set as independent variables. No effect of explanation on pressure was found $F(1/878) = 0.33, p = .570$. Realism, however, had a significant effect on pressure $F(1/878) = 16.42, p < .001$, with hypothetical conditions ($M = 35.47, SD = 29.10$) scoring significantly higher on pressure than the choice conditions ($M = 27.74, SD = 27.57$). The interaction term was not significant $F(1/878) = 1.23, p = .270$.

Acceptability

We also investigated acceptance as an outcome variable, to investigate how participants experienced the different nudges. We therefore conducted two Welch two sample t-tests to compare how acceptable the participants rated the nudge in the two hypothetical nudge conditions and in the two choice nudge conditions. The comparison between the two

hypothetical conditions showed that HN- ($M = 47.74$, $SD = 32.28$) rated the nudge as significantly less acceptable than HN+ ($M = 54.73$, $SD = 33.39$), $t(437) = -2.2$, $p = .026$; $d = 0.21$. The same comparison between the choice nudge conditions revealed a similar difference, with CN- ($M = 56.37$, $SD = 31.39$) rating the nudge as significantly less acceptable than CN+ ($M = 63.69$, $SD = 29.02$), $t(434) = -2.5$, $p = .011^4$; $d = 0.24$. We then conducted an ANOVA with realism, explanation, and their interaction term as the independent variable, and acceptance as the dependent variable. The ANOVA showed a significant effect for realism, $F(1,878) = 17.128$, $p < .001$, $d = 0.28$, with the hypothetical conditions ($M = 51.20$, $SD = 32.98$) scoring significantly lower on acceptance than the choice conditions ($M = 60.07$, $SD = 30.40$). Explanation did also have a significant effect on acceptance $F(1,878) = 11.648$, $p < .001$, $d = 0.23$, with conditions without an explanation ($M = 52.01$, $SD = 32.10$) being less acceptant of the nudge than conditions with an explanation ($M = 59.26$, $SD = 31.54$). There was not effect of the interaction term on acceptance ($p = .937$).

Supplementary Discussion

It was found that pressure correlated negatively with expected autonomy and satisfaction within conditions without an explanation, as predicted in hypothesis 3. Contrary to hypothesis 4, these correlations are equally strong in conditions with explanations. This suggests that pressure equally affects autonomy and satisfaction when the nudge is explained as compared to when the nudge is not explained.

Acceptance was, however, higher in conditions with an explanation. Additionally, hypothetical conditions scored lower on acceptance than the choice conditions. The first finding suggests that while an explanation does not lead to a weaker relationship between

⁴ This is the only instance of a difference in statistical significance between the initial sample and the sample only containing participants who passed the manipulation recollection. With the latter sample, $p = .061$.

pressure and autonomy, it still leads to a higher general acceptance of the nudge. The finding that in hypothetical scenarios nudges are seen as less acceptable, in combination with negative effects of nudges on autonomy in hypothetical scenarios but not choice scenarios, suggests that people are generally more critical of nudges when they are not asked to make a choice, but rather evaluate the use of nudges.

Chapter 5**Descriptives**

Table S5.1

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Autonomy	4.10	0.57					
2. Satisfaction	4.16	0.68	.68** [.64, .71]				
3. Competence	3.96	0.63	.67** [.64, .70]	.75** [.72, .77]			
4. Sex	0.50	0.50	.13** [.07, .18]	.00 [-.06, .06]	.00 [-.05, .06]		
5. Education	2.03	0.76	.14** [.08, .19]	.03 [-.02, .09]	.04 [-.02, .09]	.16** [.11, .22]	
6. Age	34.04	17.39	-.10** [-.16, -.04]	.03 [-.02, .09]	.07* [.01, .13]	-.33** [-.38, -.28]	-.39** [-.44, -.34]

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). Level of education is represented on a three point scale.* indicates $p < .05$. ** indicates $p < .01$.

Table S5.2

Autonomy within and between groups.

	Group 1	Group 2	Group 3	Group 4
Group 1	$M = 4.20, SD = 0.50$			
Group 2	$p < .001, d = 1.13$	$M = 3.62, SD = 0.66$		
Group 3	$p < .001, d = 0.50$	$p < .001, d = 0.56$	$M = 3.95, SD = 0.54$	
Group 4	$p < .001, d = 1.81$	$p = .003, d = 0.52$	$p < .001, d = 1.15$	$M = 3.28, SD = 0.66$

Note. M and SD on autonomy for all four groups. As well as p values from a Tukey HSD post-hoc test with group as the independent, and autonomy as the dependent variable, and Cohen's d values.

Table S5.3

Satisfaction within and between groups.

	Group 1	Group 2	Group 3	Group 4
Group 1	$M = 4.27, SD = 0.61$			
Group 2	$p < .001, d = 1.05$	$M = 3.62, SD = 0.74$		
Group 3	$p < .001, d = 0.60$	$p = .026, d = 0.38$	$M = 3.90, SD = 0.64$	
Group 4	$p < .001, d = 1.60$	$p = .016, d = 0.44$	$p < .001, d = 0.89$	$M = 3.28, SD = 0.81$

Note. M and SD on satisfaction for all four groups. As well as p values from a Tukey HSD post-hoc test with group as the independent, and satisfaction as the dependent variable, and Cohen's d values.

Table S5.4

Representativeness of the sample.

Gender	Sample	Population
Men	50%	49%
Women	50%	51%
Age		
18-24	9%	11%

25-29	9%	8%
30-34	7%	8%
35-39	7%	8%
40-44	7%	7%
45-49	8%	9%
50-54	10%	9%
55-59	9%	9%
60-64	9%	8%
65 and older	25%	23%
Education		
Low	27%	28%
Medium	42%	52%
High	30%	30%
Province		
Drenthe	2%	3%
Flevoland	2%	2%
Friesland	4%	4%
Gelderland	13%	12%
Groningen	3%	3%
Limburg	7%	7%
Noord-Brabant	16%	15%
Noord-Holland	17%	17%
Overijssel	7%	7%
Utrecht	8%	8%

Zeeland	3%	2%
Zuid-Holland	21%	21%

Note. Representativeness of our sample compared to the Dutch population.

Questionnaires

Autonomy Questionnaire

Ik had het gevoel dat ik een keuze had.

I felt like I had a choice.

Ik voelde me vrij om te kiezen wat ik wilde.

I felt free to choose what I wanted.

De omstandigheden hadden invloed op mijn keuze.*

*The circumstances influenced my decision.**

Ik had mijn eigen redenen om deze keuze te maken.

I had my own reasons to make my decision.

Ik heb nagedacht over deze keuze.

I deliberated this decision.

Ik heb erbij stilgestaan voordat ik deze keuze maakte.

I thought about it before I made my decision.

Deze keuze is typisch iets voor mij.

This decision is typical for me.

Deze keuze past bij wat ik belangrijk vind.

This decision fits what I find important.

Deze keuze zegt iets over mij.

This decision says something about me.

Satisfaction Questionnaire

Mijn keuze klopt.

My decision is sound.

Mijn keuze voelt goed.

I am comfortable with my decision.

Mijn keuze is de juiste voor mijn situatie.

My decision is the right one for my situation.

Ik ben tevreden met mijn keuze.

I am satisfied with my decision.

Het was moeilijk om een keuze te maken.*

*It was difficult to make a choice.**

Competence Questionnaire

Ik denk dat ik vrij goed ben in het nemen van dit soort beslissingen.

I think I am pretty good at making these kinds of decisions.

Ik denk dat ik deze beslissing vrij goed heb genomen, vergeleken met andere mensen.

I think I did pretty well at making this decision, compared to other people.

Na het nemen van deze beslissing voel ik me bekwaam.

After making this decision, I feel competent.

Ik ben tevreden over de manier waarop ik deze beslissing heb genomen.

I am satisfied with my performance at this decision.

Ik was behoorlijk bekwaam in het nemen van deze beslissing.

I was pretty skilled at making this decision.

Dit was een keuze die ik niet zo goed kon maken.*

*This was an activity that I couldn't do very well.**

Questions with an asterisk (*) are mirrored.

The statements were evaluated on a 5 point scale.

(Helemaal mee oneens, mee oneens, niet mee eens/niet mee oneens, mee eens, helemaal mee eens)

(Fully disagree, agree, don't agree/don't disagree, agree, fully agree)

Nederlandse Samenvatting
(Dutch Summary)

In 2008 publiceerden econoom en Nobelprijswinnaar Richard Thaler en jurist Cass Sunstein hun boek *Nudge: Improving Decisions About Health, Wealth, and Happiness*. In dit boek beschrijven de auteurs ‘nudges’ (in het Nederlands vaak aangeduid als ‘duwtjes’) als een nieuwe manier om keuzegedrag te beïnvloeden. Nudges veranderen de keuzearchitectuur, ofwel de manier waarop verschillende keuze-opties worden gepresenteerd. In de afgelopen jaren is de belangstelling voor nudges toegenomen, zowel vanuit de wetenschap als vanuit beleidsmakers. Een goed voorbeeld van een nudge is het aanbieden van fruit bij de kassa. Omdat mensen bij de kassa moeten wachten zijn ze eerder geneigd zo’n kassakoopje aan te schaffen. Vaak zijn de producten die bij een kassa liggen echter ongezond, zoals chocolade. Door fruit, in plaats van chocolade, bij de kassa aan te bieden wordt uiteindelijk meer fruit en minder chocolade verkocht.

Nudges zijn effectief omdat ze niet gericht zijn op het overtuigen van mensen om een betere keuze te maken maar inspelen op hun ‘automatische’ manier van beslissen waarbij vaak gebruik wordt gemaakt van heuristieken. Heuristieken zijn beslisregels die ons helpen om snel keuzes te kunnen maken, zonder veel te hoeven nadenken of er tijd en aandacht aan te besteden. Door het plaatsen van fruit bij de kassa speelt een supermarkt in op de ‘saliency’ heuristiek: mensen hebben meer aandacht voor een keuze optie als deze prominent en aantrekkelijk wordt aangeboden. Andere voorbeelden van heuristieken zijn sociale normen, waarbij mensen zonder daar al te uitgebreid bij stil te staan de optie kiezen waarvan ze denken dat de meeste anderen die ook zouden kiezen; of de status quo bias, waarbij mensen de neiging hebben om bij de huidige stand van zaken te blijven. Een voorbeeld van een nudge die op de status quo bias inspeelt is een default nudge waarbij mensen geneigd zijn de vooraf geselecteerde optie te kiezen. Zo kan bijvoorbeeld bij het huren van een auto een duurdere verzekering met minimaal eigen risico al aangevinkt zijn. Klanten hebben dan wel de mogelijkheid een goedkopere optie met meer eigen risico te kiezen, maar door het vooraf

selecteren van de duurdere verzekering is de kans groter dat hiervoor gekozen wordt. Default nudges bieden de gewenste optie op zo'n manier aan dat mensen alternatieve opties met de aangevinkte optie moeten vergelijken. Om daadwerkelijk af te wijken van de default moet men ervan overtuigd zijn dat een alternatieve opties beter is. Om te kwalificeren als een nudge is het echter wel een vereiste dat de keuzevrijheid behouden blijft: mensen moeten nog steeds een keuze hebben en de alternatieve optie moet nog steeds een reële optie blijven. Zo is het bij het eerdergenoemde voorbeeld van het aanbieden van fruit bij de kassa belangrijk dat klanten nog steeds chocolade in de supermarkt kunnen kopen. In de terminologie van Thaler en Sunstein houdt dit in dat nudges passen binnen het zogeheten libertair-paternalistisch gedachtengoed: libertair omdat het principe van individuele keuzevrijheid gehandhaafd blijft, paternalistisch omdat degene die de nudge aanbrengt wel degelijk een te prefereren optie specificceert.

Ondanks de premisse dat nudges individuele keuzevrijheid dienen te handhaven, zijn er zorgen dat nudges de autonomie van mensen zouden kunnen bedreigen. Deze zorgen komen voort uit de gedachte dat nudges inspelen op automatische keuzeprocessen waarbij mensen niet doorhebben dat ze genudged worden, en daarom ook niet goed in staat zijn om tegen de nudge in te gaan. Zo zou een klant die leest dat een bepaald product het meest verkochte product is, niet door kunnen hebben dat hij of zij met het gebruik van deze sociale norm verleid wordt om dit product te kopen (ook als er misschien andere, goedkopere producten zijn die beter bij de voorkeur van de klant passen). De kritiek dat nudges autonomie bedreigen is belangrijk en heeft consequenties voor het legitiem inzetten van nudges. Echter, tot dusver is deze kritiek vooral theoretisch en principieel van aard en wordt de discussie met name aangezwengeld door filosofen. Empirisch onderzoek naar het effect van nudges op de persoonlijke ervaring van autonomie ontbreekt. Het doel van dit proefschrift is dan ook om empirisch te onderzoeken hoe nudges de persoonlijke ervaring van

autonomie beïnvloeden. Concreet hebben we onderzocht hoe mensen *denken* dat nudges hun ervaring van autonomie zullen beïnvloeden en hoe autonoom mensen zich *daadwerkelijk voelen* nadat ze genudged zijn.

Voordat we dit onderscheid toe lichten, is het van belang om het verschil tussen wat wij subjectieve en objectieve autonomie noemen uit te leggen. Bij objectieve autonomie gaat het erom dat mensen feitelijk in alle vrijheid hun eigen keuze hebben gemaakt. In dit proefschrift stellen we echter subjectieve autonomie centraal. Subjectieve autonomie beschrijft het gevoel dat je je eigen keuze kunt maken. Het is een belangrijk begrip in de psychologie en wordt in de Self Determination Theory als één van de drie menselijke basisbehoeftes beschouwd..Ook is subjectieve autonomie gerelateerd aan tevredenheid met gemaakte keuzes en of mensen zich competent voelen om een keuze te maken. Critici die veronderstellen dat nudging een negatief effect op autonomie heeft, hebben het echter meestal over objectieve autonomie. Objectieve autonomie is moeilijk te meten, en om die reden niet empirisch te onderzoeken. Bovendien is subjectieve autonomie van groter belang vanuit een psychologisch perspectief waar dit als een ‘basic need’ gezien wordt en vanwege de aangetoonde invloed op welzijn en tevredenheid met gemaakte keuzes. Vandaar dat er in dit proefschrift is gekozen om ons op subjectieve autonomie te richten.

Samenvatting van empirische bevindingen

Hoofdstuk 2 beschrijft de resultaten van drie online studies. In deze studies lazen deelnemers hypothetische scenario’s waarin ze een keuze moesten maken, al dan niet vergezeld door een nudge. Vervolgens moesten deelnemers inschatten hoeveel autonomie ze zouden ervaren als ze deze keuze in het echt zouden moeten maken.

In Studie 2.1 lieten we aan deelnemers een scenario zien waarin ze naar een nieuw appartement verhuizen. Ze kregen de keuze om uit 14 groene voorzieningen (bijvoorbeeld buitenlampjes op zonne-energie of een waterbesparend toilet) te kiezen met ofwel een default

nudge (waarbij alle 14 voorzieningen vooraf geselecteerd zijn), ofwel een tekst gericht op overtuiging (een verzoek om zo veel mogelijk voorzieningen te kiezen) ofwel een controleconditie zonder nudge of overtuiging. Daarna werd uitgelegd wat de nudge is, hoe deze werkt, en dat mensen zich meestal niet bewust zijn van de aanwezigheid van een nudge. We vonden dat mensen in de nudge conditie lagere verwachtingen voor hun autonomie hadden dan in de andere twee condities, welke niet significant van elkaar verschilden.

In Studie 2.2 hebben we naast de drie condities van Studie 2.1 een sociale norm nudge toegevoegd die benadrukte welke voorzieningen de meeste andere mensen hadden gekozen. We vonden opnieuw dat de default nudge tot lagere verwachtingen voor autonomie leidt, maar de sociale norm nudge niet. Dit suggereert dat verschillende types nudges verschillende verwachtingen met betrekking tot autonomie als gevolg hebben.

In Studie 2.3 hebben we de uitleg over de gebruikte nudge gemanipuleerd. In de helft van de condities werd de nudge uitgelegd zoals in Studie 2.1 en 2.2. In de andere helft van de condities hebben we de uitleg ingekort, en niet expliciet vermeld dat de meeste mensen zich niet bewust zijn van de nudge. De resultaten lieten zien dat de default nudge conditie met de originele uitleg lager scoorde op verwachte autonomie dan de controleconditie, terwijl de default conditie met korte uitleg die niet vermeldde dat mensen zich niet bewust zijn van de nudge vergelijkbaar scoorde ten opzichte van de controleconditie. Dit suggereert dat met name de uitleg over de onbewuste werking van nudges een lagere verwachting van subjectieve autonomie veroorzaakt.

Het zou kunnen dat de verwachtingen van de proefpersonen rondom hun autonomie niet overeenkomen met daadwerkelijk ervaren autonomie als ze in het echt een keuze hadden moeten nemen. Desalniettemin zijn verwachtingen relevant voor de opinie die leken en professionals over nudging als interventie hebben en daarmee voor de mate waarin nudges geïmplementeerd worden in de praktijk. Daarnaast suggereren de resultaten uit Hoofdstuk 2

dat met name default nudges als bedreigend voor autonomie worden waargenomen. Dit hebben we als startpunt genomen voor de onderzoeken in het volgende hoofdstuk naar het daadwerkelijk effect van nudges op autonomie.

Hoofdstuk 3 beschrijft de resultaten van drie online studies die als doel hadden om inzicht te krijgen hoe autonoom mensen zich voelen nadat ze daadwerkelijk genudged zijn en hoe zich dat verhoudt tot verwachtingen met betrekking tot autonomie. In deze studies werden deelnemers gevraagd om de wetenschap te helpen door naast het onderzoeksgedeelte waarvoor ze een vergoeding kregen een extra vragenlijst van vijf minuten in te vullen zonder vergoeding. Er waren drie condities: In de default nudge condities was het antwoord 'ja' al aangevinkt, in de sociale norm nudge conditie kregen deelnemers extra informatie dat de meerderheid van de eerdere deelnemers 'ja' hebben gekozen, en in de controleconditie werd de vraag neutraal gepresenteerd. Deze condities werden ofwel in een hypothetisch scenario gepresenteerd, of in een scenario waarin deelnemers werden gevraagd direct een daadwerkelijke keuze te maken. Beide condities waren verder identiek om vergelijking tussen de hypothetische en daadwerkelijke keuzes mogelijk te maken.

Het doel van Studie 3.1 was om de bevindingen van Hoofdstuk 2 te repliceren, dat wil zeggen dat mensen verwachten dat default nudges (maar niet sociale norm nudges) hun autonomie negatief zou beïnvloeden. De resultaten wezen de veronderstelde richting op, maar waren niet significant.

In Studie 3.2 werden de deelnemers daadwerkelijk gevraagd of ze een vijf minuten langere vragenlijst wilden invullen. De resultaten lieten zien dat de default nudge, maar niet de sociale norm nudge, effectief was in het bewerkstelligen van de gewenste keuzes en, belangrijker, dat er geen verschillen waren tussen de drie condities in de mate van subjectieve autonomie na het maken van de keuze.

Studie 3.3 omvatte zowel hypothetische condities als condities waarin deelnemers daadwerkelijk genudged werden met als doel deze direct te kunnen vergelijken. Daarnaast hebben we in beide condities de uitleg gemanipuleerd, waarbij deelnemers al dan niet werd uitgelegd dat er een nudge was en hoe die werkt. De resultaten lieten zien dat mensen verwachtten dat default nudges, maar niet sociale norm nudges, autonomie negatief zouden beïnvloeden. Dit was alleen het geval in de conditie waarin de default nudge uitgelegd werd. Deze resultaten vormen daarmee een replicatie van de bevindingen uit Hoofdstuk 2. Bovendien werd, net zoals in Studie 3.2, gevonden dat deelnemers in de daadwerkelijke nudge condities zich niet minder autonoom voelden dan in de controleconditie, onafhankelijk van een uitleg van de nudge. De resultaten van Hoofdstuk 3 suggereren dus dat mensen wel verwachten dat de default nudge, maar niet de sociale norm nudge, hun autonomie in lichte mate negatief zal beïnvloeden (en ook alleen als ze van de nudge bewust worden gemaakt en deze wordt uitgelegd), maar zich niet minder autonoom voelen als ze daadwerkelijk worden genudged door middel van een default nudge of sociale norm nudge.

Hoofdstuk 4 bevat één online studie waarin het effect van transparante nudges op autonomie wordt onderzocht. Transparante nudges zijn nudges die uitgelegd worden aan de beslisser, zodat deze zich bewust is van de aanwezigheid en het effect van de nudge (vergelijkbaar met sommige condities in Studie 3.3). Critici, die aangeven dat nudges een bedreiging zijn voor autonome keuzes omdat mensen zich niet bewust zijn van de invloed van een nudge, noemen vaak het transparant maken van nudges als een mogelijke oplossing. Het is echter nog niet empirisch onderzocht of transparante nudges een positief effect hebben op subjectieve autonomie. Het design van de online studie in Hoofdstuk 4 is identiek aan dat in Hoofdstuk 3. Ook hier kregen deelnemers de vraag vrijwillig een langere versie van een vragenlijst in te invullen, waarbij drie verschillende varianten van transparantie van een default nudge werden aangeboden. In de niet-transparante conditie werd de aanwezigheid van

de nudge niet benoemd, in de doel-conditie werd de aanwezigheid en het doel van de nudge uitgelegd, en in de doel-en-onbewust conditie werd de aanwezigheid en het doel van de nudge uitgelegd met de toevoeging dat de meeste mensen zich niet bewust zijn van het doel van de nudge. Het resultaat van de studie was dat de drie condities niet verschilden in hun effect op subjectieve autonomie: De deelnemers in de niet-transparante conditie scoorden al hoog op autonomie en transparantie voegde daar niets aan toe.

Hoofdstuk 5 bevat ook één onlinestudie met als doel te testen of nudges autonomie mogelijk bedreigen bij keuzes die erg belangrijk zijn voor de beslisser, in dit geval de beslissing om al dan niet orgaandonor te worden. Het kader van deze studie was de nieuwe Nederlandse donorwet, ingevoerd in 2020. Vóór de invoering van de nieuwe wet werden mensen die hun keuze (donor, niet-donor, of donor voor bepaalde organen en weefsels) niet actief bij het donorregister melden automatisch als niet-donor geregistreerd. Door de nieuwe wet wordt dit systeem omgedraaid van deze zogenaamde ‘opt-in’ constructie naar een ‘opt-out’ constructie en worden mensen die niet zelf de keuze maken automatisch als donor geregistreerd. Om burgers over de nieuwe wet te informeren heeft de overheid op 1 juli 2020 een brief aan alle niet-geregistreerde burgers gestuurd. In deze brief werd uitgelegd dat ze nog zes weken de tijd hadden om hun keuze door te geven en dat ze, indien ze na zes weken nog geen keuze gemaakt hadden, automatisch als donor geregistreerd zouden worden. Daarbij werd ook benadrukt dat ze naderhand nog altijd de vrijheid hadden om hun keuze aan te passen.

Deze verandering in de donorwet kan gezien worden als de invoering van een default nudge. De keuzearchitectuur is namelijk zo veranderd dat donor zijn de makkelijkste keuze is, omdat je daarvoor niets hoeft te doen. Tegelijkertijd hebben burgers wel nog steeds de mogelijkheid om een andere keuze door te geven en kost het veranderen van je keuze niet veel moeite (de online registratie duurt ongeveer twee minuten). Met deze studie wilden we

onder andere vergelijken hoe autonoom burgers die nog geen brief hebben ontvangen en nog geen keuze hebben gemaakt (de niet-nudge conditie) zich voelden ten opzichte van burgers die na deze brief een keuze hadden gemaakt (de nudge condities). Anders dan de hypothetische scenario's en de daadwerkelijke beslissingen die deelnemers in eerdere studies namen en waarbij het ging om keuzes die geen grote gevolgen hebben, is dit een beslissing die mensen over het algemeen als belangrijk zien. We waren benieuwd of de nudge hierdoor mogelijk een negatievere invloed op de subjectieve autonomie zou hebben. Een belangrijke kanttekening bij deze studie is dat dit geen experiment is en we dus geen uitspraken kunnen doen over causaliteit tussen autonomie en de manier waarop mensen hun keuze hebben gemaakt.

Deze studie bestond uit twee delen. In het eerste gedeelte stelden we de deelnemers een aantal vragen rondom de donorregistratie, zodat we de deelnemers in één van vier groepen konden categoriseren. De deelnemers in Groep 1 hadden zich vóór 1 juli al ingeschreven, zij waren niet de doelgroep voor de nudge en zouden ook geen brief ontvangen omdat ze hun keuze reeds hadden geregistreerd hadden. Groep 2 bestond uit deelnemers die nog niet geregistreerd waren maar ook nog geen brief hadden ontvangen. Deze groep viel dus wel onder de doelgroep van de nudge, maar was nog niet blootgesteld aan de nudge en kan dus gezien worden als de geen-nudge controle groep. Groep 3 en 4 zijn de groepen die reeds genudged zijn met een brief: De deelnemers uit Groep 3 hadden een brief ontvangen en zich vervolgens ook actief geregistreerd; In Groep 4 zaten deelnemers die wel reeds de brief hadden ontvangen maar vervolgens geen keuze hadden doorgegeven en dus automatisch donor waren geworden. Groep 3 en 4 verschilden dus in hun reactie (actief of passief) op de nudge. In het tweede gedeelte van de studie werden de deelnemers gevraagd hoe autonoom ze zich over hun donorregistratie-keuze voelden.

De resultaten lieten zien dat mensen in Groep 1, Nederlanders die zich al vóór 1 juli geregistreerd hadden, zich het meest autonoom voelden. Onder de groepen die zich niet vóór 1 juli geregistreerd hadden en die dus de doelgroep vormden die genudged werden of nog zouden worden zien we dat mensen die de brief nog niet hadden ontvangen (Groep 2) lager scoorden op subjectieve autonomie dan mensen die de brief reeds hadden ontvangen en vervolgens een eigen keuze registreerden (Groep 3). Nudgen heeft voor deze mensen in Groep 3 dus een dubbel positief effect: ze registreren zich en ze voelen zich meer autonoom. Echter, de relatief kleinere groep mensen die genudged werd maar vervolgens geen actieve keuze had gemaakt en dus automatisch als orgaandonor werden geregistreerd (Groep 4), ervaren wel degelijk minder autonomie. Zij voelden zich minder autonoom dan de deelnemers in alle andere groepen. Daarbij is het wel van belang te vermelden dat de autonomie desalniettemin relatief hoog blijft (gemiddeld 3.6 van 5). Actief zelf een keuze te maken blijkt dus belangrijk te zijn. Dit suggereert dat beleid als doel zou moeten hebben om zo veel mensen mogelijk te motiveren uiteindelijk actief een keuze te maken. Daarnaast laat deze studie zien dat vervolgonderzoek nodig is om te begrijpen wanneer en waarom nudges autonomie hinderen voor dit soort belangrijke keuzes, welke rol het zelf maken van een keuze speelt en hoe we negatieve effecten op autonomie als gevolg van nudging kunnen voorkomen.

Bevindingen

De hoofdbevinding van dit proefschrift is dat nudges een beperkt negatief effect op de beleving van autonomie lijken te hebben, vergeleken met de controle condities. Zelfs als een nudge conditie lager scoorde was het niveau van subjectieve autonomie hoog. Voor verwachtingen met betrekking tot de subjectieve autonomie lijkt de soort nudge van invloed te zijn. Zo lijken default nudges, waar gebruik wordt gemaakt van de status quo bias, tot een iets lagere verwachting van subjectieve autonomie te leiden terwijl sociale norm nudges geen

of zelfs een positief effect op deze verwachting hebben. Een negatief effect op autonomie verwachtingen werd echter alleen maar gevonden als aan de genudgede persoon werd uitgelegd dat mensen zich meestal niet bewust zijn van de aanwezigheid van de nudge. Deze bevinding komt overeen met het hoofdargument van nudge critici, namelijk dat nudges de genudgede persoon beïnvloeden zonder dat zij zich ervan bewust zijn. Nudges hebben dus een andere invloed op verwachte autonomie dan op ervaren autonomie, en verwachte autonomie is geen goede graadmeter voor ervaren autonomie. De studies suggereren ook dat nudge transparantie geen (positief of negatief) effect heeft op de daadwerkelijk ervaren subjectieve autonomie.

Implicaties

Hoofdstukken 2 en 3 suggereren dat de verwachting over de ervaren autonomie verschilt tussen verschillende soorten nudges. In Studie 2.3 werd gevonden dat transparante sociale norm nudges zelfs tot een hogere verwachte autonomie leiden. Deze resultaten suggereren dat voor de discussie over autonomie niet alle nudges over een kam geschoren moeten worden. Er is meer nuance nodig om te begrijpen welke nudges autonomie beïnvloeden. Dit sluit aan bij pogingen in de literatuur om verschillende soorten nudges op een goede manier te categoriseren. Beleidsmakers die overwegen nudges in te zetten in beleid moeten zich niet alleen bekommeren om de effecten van die nudges op keuzegedrag maar ook kijken welke nudges mogelijk verwachtingen van autonomie beïnvloeden. Negatieve verwachtingen zouden namelijk tot een negatief imago van nudges en mogelijk tot weerstand tegenover nudges kunnen leiden.

Verder suggereren de resultaten van Hoofdstuk 5 dat er mogelijk belangrijke verschillen bestaan tussen verschillende typen default nudges, iets dat tot op heden nog niet veel aandacht in de literatuur heeft gehad. De studies uit Hoofdstukken 2 tot en met 4 bevatten, wat men een actieve default zou kunnen noemen. Hier werden één of meerdere

opties al vooraf aangevinkt, maar de beslisser moet dit uiteindelijk actief bevestigen. In de orgaandonatie studie in Hoofdstuk 5 kiezen mensen de default optie als ze geen actieve keuze maken, dit noemen wij een passieve default. Alhoewel deze studie observationeel van aard is en er dus geen causale verbanden aangetoond kunnen worden, geven de resultaten aanleiding om te verwachten dat een passieve default mogelijk kan leiden tot een lage beleving van autonomie. Er is echter meer experimenteel onderzoek nodig om deze veronderstelling te bevestigen. Als het inderdaad zo is dat passieve defaults een negatief effect op ons gevoel van autonomie hebben, dan is dit van cruciaal belang voor beleidsmakers. Het beleid rondom wetten als de nieuwe orgaandonor wet zou dan meer aandacht moeten besteden aan het zodanig aanbieden van de nudge dat mensen uiteindelijk een actieve keuze kunnen maken.

Ten slotte bevestigen de resultaten uit Hoofdstuk 5 de conclusie uit het rapport ‘Denken is nog geen doen’ van het Wetenschappelijke Raad Voor Het Regeringsbeleid (WRR). In het rapport wordt het belang van het doenvermogen van de burger benadrukt. De resultaten uit Hoofdstuk 5 laten zien dat zelfs als mensen herinnerd worden om zichzelf te registreren dit niet altijd gebeurt. De WRR adviseert het gebruik van nudges als oplossing voor een laag doenvermogen, maar de resultaten van Hoofdstuk 5 suggereren dat passieve defaults het probleem niet helemaal oplossen, aangezien het stimuleren van de gewenste uitkomst in dit geval ten koste gaat van de subjectieve autonomie. Er is meer onderzoek nodig om te begrijpen welke nudges het doenvermogen kunnen verhogen, of geen negatief effect op autonomie hebben voor mensen met laag doenvermogen.

Conclusie

De studies uit dit proefschrift laten zien dat mensen door bepaalde type nudges, met name default nudges, verwachten dat zij een lager gevoel van autonomie zouden ervaren. Naar aanleiding van deze bevinding zouden beleidsmakers meer moeten letten op hoe zij communiceren over nudges om negatieve verwachtingen over het effect van nudges op

autonomie te voorkomen, zodat geen negatieve associaties met, of een negatief imago van, nudges in de bevolking ontstaan. In de realiteit ervaren mensen echter niet minder autonomie als ze daadwerkelijk genudged worden, met uitzondering van het gebruik van wat wij eerder passieve defaults noemen (zoals uit de orgaandonatie studie bleek). Terwijl dit niet een volledige antwoord is op critici's theorie dat nudges (objectieve) autonomie kwetsen, laat het wel zien dat mensen dit blijkbaar niet zo waarnemen en daardoor psychologische gevolgen zoals lager welzijn of weerstand onwaarschijnlijker zijn. Verder is belangrijk dat het transparant maken van nudges geen effect heeft op de daadwerkelijk ervaren autonomie, zoals in de literatuur bij herhaling gesuggereerd wordt.

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Curriculum Vitae

Jonas Wachner was born on the 12th of December in 1992 in Hamburg, Germany. In 2012 he moved to the Netherlands and started studying Psychology at the Radboud University in Nijmegen. In 2015 he graduated the bachelors, with a focus on behavioral psychology. In 2017 he graduated from the Behavioral Science research master at Nijmegen University. In 2017 he started his PhD project at the department of Social, Health, and Organizational Psychology at Utrecht University, under the supervision of prof. dr. Denise de Ridder and prof. dr. Marieke Adriaanse. The project was part of the research program NUDGIS (Novel Understanding of Designs for Good Intervention Strategies in the food environment) financed by NWO. From January 2022 onwards, Jonas Wachner will work as a senior advisor at the Dutch Ministry of Justice and Security.