Erasmus University Rotterdam

Erasmus School of Economics

Economics and Business: Marketing

Master Thesis

Nudging Toward Sustainable Fashion Consumption

How nudging can be used to change consumers preferences to be more sustainable

Supervisor: Dr. Agapi Thaleia Fytraki

Author: Magdalena Smoczyk

Student number: 95170

Academic Year 2021/2022

Submission date: 08/08/2022

Abstract

In thesis the two main topics were combined: the nudging and sustainable fashion preferences in the online environment. The two main goal was to test the how social nudging and informal nudging leads to higher sustainable preference than no nudge. Then, it has been observed that the significant factor for e-commerce platform is assortment size, yet it was not discovered in the combination with nudging. The main question of the study was to find if the choice set affects the relationship between nudging sustainable preferences. The hypothesis was assuming that the sustainable preference for social nudged product is higher for smaller assortment size. Furthermore, it has been researching that the sustainable consumption is increasing though younger adults became an essential part of their generation. Over 467 participants took part in the online experiments that were divided into 6 different conditions to test nudging instruments and small or large choice set to finally compare it with control group. The main group of the respondents was the Generation Z. From the results it was claimed that both social and informal nudging have a positive effect on sustainable preference among younger adults. Moreover, it has been showed that even though the Generation Z is more aware about the sustainable fashion consumption, without the nudged over 70% of participants had chosen the non-sustainable product in the study. Nudging has been showed as a necessary tool to increase awareness and sustainable fashion consumption.

Keywords: nudging – sustainability – assortment size – e-commerce – generation Z

Acknowledgements

Table of content

1. Introduction

Nowadays, climate change and the risks associated with environmental degradation have been marked as one of the major global risks. After the oil industry, fashion industry remains to be the second largest contributor to environmental problems (Dhir, Sadiq, Talwar, Sakashita, & Kaur, 2020). The fashion industry is responsible for 10% of global CO2 emissions per year. Moreover, fast fashion has affected not only the environment and business by decreasing the prices and quality of clothing, but also the customers preferences. Clothing production has doubled in last 15 years and the demand for the cheap clothing has been high as never before in the history (2020).

At the same time, the group of more aware customers is growing by the effect of overwhelming advertisement, promoting overconsumption, and rising awareness about climate crisis (Stern, 2002). Conscious buyers are demanding from the companies to be more sustainable, and ecologically driven. They require to reduce carbon footprint, respect for natural resources and human labor from the fashion brands (Hankammer, Kleer, & Piller, 2020).

Consequently, companies to maintain their market position, begin to pay attention to the social responsibility aspect of their business. Sustainable development established a new role in the key strategy of company's development. Companies must set new standards for sustainability and responsibility, especially in the context of the forecasted risks and challenges posed by climate change (White, Habib, & Hardisty, 2019). While the world is moving towards a low-carbon and closed-loop economy, companies will need to make fundamental investments and strategic decisions about growth and decarbonization pathways, including the direction and extent of changes in business models (2021).

1.1 Research problem and motivation

Over the year the consumers' perceptions started to change when the climate crisis became more visible. In 1994, sustainable consumption was established by the Oslo Symposium which changed the perception of the consumer and started a new research field (Ofstad, Westly, & Bratelli, 1994). Later, the pro-environmental behavior has been showed as an integral part of everyday choices (2020).

Nevertheless, the fast fashion companies are constantly developing and selling more clothes, especially online. New research showed the global growth in ecommerce fashion by almost 10 percent from 2019 to 2020 and it is predicted to grow by an extra 10 percent by 2025 (2021). Even thought, the over 60 percent

of consumers are considering sustainability as a significant purchase criterion (Global Sustainability Study 2021), the domination of fast fashion is still the notable dilemma of these days.

A way to address this issue is nudging towards sustainable consumption. Richard Thaler and Cass Sunstein introduced the concept of nudging and choice architecture arguing that creating structures lead toward making better decisions (2008). Over the years, the digital nudging has been deeply researched and multiple nudging instruments have been discovered that have a positive effect on sustainable preferences in digital environment (Demarque, Charalambides, Hilton, & Waroquier, 2015) and can shift consumer behaviors to be more sustainable (White, Habib, & Hardisty, 2019).

While there is a plethora of evidence on the effect of digital nudging on sustainable preferences, there is a little research on the moderators than influences relationship between these variables. When it comes to fashion industry the effect of assortment size has not been researched yet in terms of sustainable preferences. Yet, the choice set is crucial tool that effects on customer decision making process (Gazquez-Abad & Martinez-Lopez, 2014).

The empirical analysis showed both positive and negative effect of assortment size on purchase likelihood in digital environment. While large choice set often emphasizes consumers' purchase likelihood (Koelemeijer & Oppewal, 1999), the choice overload effect might occur and reduce the willingness to pay (Iyengar & Lepper, 2000). For retailer the decision about choice set it complex and associated with many risks such as information overload (Iyengar & Lepper, 2000).

What is not discovered yet, but relevant to find is the influence of assortment size on the relationship between digital nudging and sustainable preferences. Separately assortment size and nudging effect are well research topics. Moreover, they have impacted the consumer's decision-making process toward specific product or preferences. It is not researched yet how the assortment size might moderate the nudging process and effectiveness.

1.2 Research objective

The main aim of the study is to determine the impact of assortment size on the relationship between digital nudging and sustainable preference towards fashion brands.

The first objective of this study is to recognize the digital nudging instruments that shows the strongest effect on the sustainable preferences in fashion brands. The research shows many digital nudging experiments, but literature review will examine which of them have proved the most effective results in sustainable preferences in fashion industry environment.

The second objective is to identify how the choice set is affecting the sustainable customer preferences.

Lastly, the research will be done on the effect of the varying the assortment size on the effectiveness of digital nudging instruments that showed positive effect on the sustainable preferences in fashion industry environment.

The main question of the research: What is the influence of digital nudging instruments and assortment size towards sustainable fashion preferences?

Consequently, **the sub-questions are:**

1. Which digital nudging instruments shows the strongest positive effect on the sustainable fashion preferences?
2. What is the effect of assortment size on sustainable preferences in the fashion industry?
3. Does the size of an assortment influence nudging effectiveness toward sustainable fashion preferences?

1.3 Academic and managerial relevance

This paper's purpose is to find new relevant insights into digital nudging use. The topic itself has been discovered and briefly described in academic papers, yet the application of its instruments can vary based on the context. By researching the impact of assortment size on the relationship between digital nudging and sustainable preferences toward fashion brands, new significant aspects will be discovered that academics can use in future research into consumers changing customer preferences. Moreover, the choice set has showed different results in previous papers, so new research in different settings and industry will show what moderates the outcome.

For sustainable fashion brands executives and practitioners, this paper can be used in building innovative marketing strategies that are based on the newest trends in the fashion industry and customers' preferences. Moreover, this research can be interesting of user experience specialists that are working on the newest outcomes to understand current trends and customer preferences to design the most effective websites. In general, by exploring the effects and better understanding of nudging that positively influence sustainable fashion consumption, retailers can use this as an additional marketing measurement to sell their products.

1.4 Research methodology

To investigate the above research objectives and test hypothesis, an online experiment will be performed. The study will use a between-subject design and will include treatment and control groups. Selected sustainable and non-sustainable products will be displayed to create a hypothetical customer decision making situation.

First part of online survey will test specific nudging instruments towards sustainable preference. All participants will be exposed to nudging instruments determined in the literature review.

The second part of the survey will test moderating effect of assortment size on the researched relationship. Both groups will be manipulated by one assortment – small or large choice ser, which number of choices will be determined in the literature review. Participants will answer the questions in the survey based on the proposed hypothesis. The questionnaire and methodology will be detailed in Chapter 3.

1.5 Thesis outline

The structure of this thesis is as follows. In chapter 2, the theoretical framework of sustainable consumption will be explained. Next, the nudging concept in digital environment will be briefly discussed to identify these digital nudging instruments that shows the strongest positive effect on the sustainable preferences in the fashion industry. Then, the effect of assortment size will be research to answer research questions and sub questions. The literature review will be used to develop the hypothesis of the paper. In chapter 3, the research methodology will be briefly described how it will be used for this study. Again, the chapter 4 will contain the analysis of the experiment will be conducted and interpreted. Lastly, the final chapter 5 will discuss on the answers to the hypotheses and research questions and conclude on interesting findings for further research.

2. Literature Review

The goal of literature review is to construct a theoretical background for sustainable consumption, digital nudging towards sustainable preferences and assortment size. The nudging itself is a broad concept, yet for the purpose of this study, this literature review will only focus on the nudging in the online environment and towards sustainable preferences.

2.1 Sustainable consumption

Since the Earth Summit in 2002 sustainable consumption has been the subject of many political and social debates. The problem itself became the consumers' response to global environmental crisis and social problems, often associated with consumer demonstration of their power against unfair and exploitative companies (2020). The term itself is defined as "*the use of services and related products which respond to basic needs and bring a better quality of life, while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations*" (Sylvi Ofstad, 1994).

After the World Summit on Sustainable Development in Johannesburg, where the Political Declaration and Implementation Plan has been presented to encourage partnerships between the public and private sector (2002), sustainable consumption became not only a consumer dilemma, but also affected changes in the business sector. The newest research shows that the sustainable consumption is considered as a significant part of the integrated sustainability into everyday choices and exhibit pro-environmental behavior (Hankammer, Kleer, & Piller, 2020). Furthermore, the term pro-environmental behavior is a part of the sustainable consumption that has based their goals on the environmental sustainability, conservation of natural resources and protecting ecosystems to ensure long-term viability of current and future generation on this planet (Paul C. Stern, 1995).

The sustainable consumption has affected both consumers and businesses. Consequently, with the change of consumers behavior and beliefs, the organization management and business attitude has been shifted towards sustainable developments (Kotler, Kartajaya, & Setiawan, 2010). When the traditional marketing incentivizes growth, promotes the endless pursuit of needs, a sustainable capacity orientation suggests that the resources used can be renewed, as so the capacity of both resources and the environment are limited (2019). Such concept of green marketing is interpreted as the holistic management process to deal with customers' and society's environmental requirements in a sustainable and profitable way (Peattie, 1992). Furthermore, promotes firm's environment management systems and procedures that are trying

to cope with climate crisis. Importantly, the term has been described as a respond of society's environmental requirements towards business (2020).

What is notable for this paper, the green marketing shows a positive effect on educating consumers about sustainable choices. Significantly, providing knowledge can have positive effect on the purchase probability, willingness to pay and positive perception of the firm (White, Habib, & Hardisty, 2019). Research has proven that companies who are switching to operate more sustainably and are open to transport new into business models have a strong potential to earn higher profit in the long term (Kotler, Kartajaya, & Setiawan, 2010).

2.2 Nudging in the digital environment

The nudging theory was first used by Richard Thaler and Cass Sunstein in 2008 based on the idea of applying the techniques of the decision-making process to improve decisions without limited choices (2008). Directly speaking, Thaler described "a *nudge is any small feature in the environment that attracts our attention and alters our behavior"* (2008)*.* The concept suggests a positive reinforcement in the physical environment, and indirect suggestions as ways to shape the behavior and decision making of groups or individuals (Sunstein, 2013).

The concept of nudging was originally performed in the offline settings, yet over time it has been transferred to the online world. Digital nudging was defined by Weinman et al as *"the use of user- interface design elements to guide people's behavior in digital choice environments"* (2016)*.* Furthermore, continuing research by Meske and Pothoff (2017) has developed the direct relationship between nudging in the digital environment is and user interface where nudging is a part of the presented content and information. Authors have defined nudging in the digital environment as a *"subtle form of using design, information and interaction elements to guide user behavior in digital environments, without restricting the individual's freedom of choice"* (2017)*.*

Digital nudges can be used in multiple online technologies and channels such as mobile applications, social media, gamification, e-commerce etc. When it comes to the advantages of digital nudges, most importantly they are relatively inexpensive and can be applied quickly. In the online environment the experiment or research can be conducted faster than in the offline settings. Moreover, the outcome will be known in days, not years which is highly relevant for education purposes. Second key advantage is the unprecedented scale offered by the digital nudging where potentially small change can affect millions of users to make better decisions (Ozdemir, 2019).

Research by Dennis Hummel and Alexander Maedche claimed the effectiveness of digital nudging is highly affected by the context (2019). Yet, researchers Christoph Schneider, Markus Weinmann, and Jan Vom Brocke do not recommend a 'one size fits all' approach as the effectiveness most of the time depends on user's personal characteristics. In digital environments, the characteristics of decision-makers can be depended on users' past decisions or demographic characteristics (Schneider, Weinmann, & Brocke, 2018).

In order to create an effective nudge, both in online or offline settings, the behavior and context must be well understood. Therefore, there need to be considered two types of thought processes which are system 1 and system 2 introduced by Daniel Kahneman. The first system, named automatic thinking acts promptly with little or no effort and no perception of voluntary control. The second one, reflective thinking operates on complex calculations, needs more focus and attention toward demanding mental activities. It functions is often associated with a subjective experience of causality, choice, and concentration (Kahneman, 2011). These dual processes of thinking do not work independent and might interact. Yet, the system 2 is depended on the system 1 but not inversely (Hansen & Jespersen, 2013); (Thaler & Sunstein, 2008).

System	Automatic	Reflective
Definition	The automatic mind processes separately, simultaneously, and often unconsciously.	The reflective mind has limited capacity, but offers systematic and 'deeper' analysis.
Characteristics	Uncontrolled, effortless, emotional, fast, and unconscious.	Controlled, effortful, deductive, slow, and self-aware.
Impact on nudging	Behavior is habitual.	Behavior is considerate.
Nudging instruments that impact the behavior	Default Salience Priming	Message Incentives Norms Commitment

Figure 1 The Mindspace framework (Dolan, et al., 2012).

2.3 Digital nudging toward sustainable preferences

The previous research investigated how pro-environmental consumer behavior has changed over the year which affected the digital nudging. Hankammer has showed that consumer might have difficulties to be consistent with their sustainable attitude in practices such as accepting sharing and circular business model. Nevertheless, the research verified the co-determination on the environmental impact of the final

customized product with the individual attitude towards sustainability. In other terms, offering sustainable variants of attributes allows users to customize their products based on their personal preferences and motives toward sustainable choices (2020). Such approach does not jeopardize the consumer satisfaction, so might be applied especially in the fashion industry where not brands are sustainable yet. Yet, what already has been proven the digital nudges can be applied successfully to encourage decision-making processes and alter individuals' behavior (Weinmann, Schneider, & Brocke, 2016).

Moreover, in the research paper Katherina White and others discussed how to shift customer behavior to be more sustainable. There was proposed a framework that shows the different practices that can be used to influence sustainable behavior and demonstrates the relationship between social influence, habit formation, individual self, feelings and cognition and tangibility on encouraging more sustainable behaviors. Thus, the overall recommendation from the paper was to recognize the behavior and the context in which the action has occurred. In other terms, to deeply acknowledge intensions as well as barriers associated with the user's behavior (White, Habib, & Hardisty, 2019). These findings will be developed in further sections and a predominant discovery to nudging instruments adaption in the online experiment.

Finally, the most recent research was testing overall effectiveness of nudging promoting pro-environmental behavior demonstrated the positive outcome among majority of studies. Therefore, the research indicates a significant outcome that nudging is based on human behavior which is a unique entity. Various people do indeed have their own characteristics, which cannot be manipulated. Such characteristics may influence the effect of a nudging (Wee, Choong, & Low, 2021).

Nevertheless, the majority of empirical evidence have reported positive outcome of digital nudging effectiveness towards sustainable preferences.

2.4 Digital nudging instruments

The tools of choice architecture can be separated into several categories, yet for the purpose of this research paper nudging instrument are divided to two main groups – social nudge and informal nudge. These two groups of nudging will be briefly discussed in the further section.

The table present the significant instruments with examples and psychological effects. Importantly, each nudging mechanism can be based on one or more psychological effects where their execution can different. As so, to perform a distinctive set of interactions between their effects (Jesse & Jannach, 2020).

Nudge Instrument	Example	Psychological Effect	Papers
Use of social influence	Eco-labels; Labeling	Social norms or descriptive norm;	(Demarque, Charalambides, Hilton, & Waroquier, 2015); (Lee, et al., 2019); (Pereira, Carvalho, Dias, Costa, & António, 2021).
Informational Intervention	Framed information or content	Framing	(Meske & Potthoff, 2017).
	Educational messages	Priming	(Lee, et al., 2019); (Wee, Choong, & Low, 2021).

Figure 2 Nudging instruments.

2.4.1 The Social Norm Nudge

According to research of Cialdini and Goldstein, the majority people feel uncomfortable acting outside social norms, while feeling pleasant when they hear that they are better than average. Social norms, or beliefs present what is socially appropriate in a specific context, that can have a strong impact on sustainable consumer behaviors (2004). Moreover, the term "descriptive norm" was described to mention the information about what other people are commonly doing.

The use of social norm has been described in the SHIFT framework as one of the most powerful factors to influence behavior, where descriptive norms were tested to have the strongest effect on sustainable consumer behaviors among other social factors. Yet, what was discovered it the fact that descriptive norms are most successfully when mixed with reference to similar contexts (White, Habib, & Hardisty, 2019).

The first example of effectiveness of descriptive norms in influencing pro-environmental behavior were analyzed in the research by Christophe Demarque and his colleagues. The experiment was testing whether the descriptive norms can influence shopping for "green" products in an online shopping environment. Despite the fact, that the experiment was held toward grocery products with eco-labels, the social norms showed positive effect in increasing sustainable consumption of these products (Demarque, Charalambides, Hilton, & Waroquier, 2015). While the descriptive norms constitute decisional shortcuts, the key results of this paper confirm the effectiveness that can provide strong behavioral incentives.

What we can learn from using eco-labels toward sustainable preferences, is the fact that these eco-labels are giving products a certain social value, in other words they are socially approved (Demarque, Charalambides, Hilton, & Waroquier, 2015).

The majority of the sustainable fashion brands do not have the same eco-labels as grocery products, but eco certificates attesting to sustainable development, manufacturing, management, and other factors.

The eco labels showed a positive effect on consumers who are already socially conscious (Shen & Dickson, 2001). It is reached that ecolabeling can contribute to consumers trust from a business perspective as well as improving its reputation while initiating raising awareness amongst customers (Wojnarowska, Sołtysik, & Prusak, 2021).

However, the researched also showed negative or marginal impact of existing labels such as the EU Ecolabel on the customer behavior, even though majority of consumers are concern about environmental issues (Grunert, Hieke, & Wills, 2004).

Yet, at this point it is significant to mentioned that all personal characteristic (gender, age range, profession, academic area) are affecting the willingness to pay. Recent research showed that most of the respondents have a positive attitude towards sustainability performance in the fashion industry (Pereira, Carvalho, Dias, Costa, & António, 2021). This is not only because sustainability is a recent topic, but also due to the evidence that it is increasingly being implemented in the education of younger generations which is mainly generation Z.

Generation Z refers to the generation born between 1997-2012, following millennials. They have been exposed to the internet and social networks since they were young which makes them true digital native (McColl & Ritch , 2020). This generation is more aware of the problem and in general against of the fast fashion (2021). The newest global survey by Deloitte showed that younger generation is highly concerned about climate change and actively trying to lift their habits such us buying more sustainable products (2022). Furthermore, most Generation Z shoppers would rather to buy sustainable brands and are willing to spend over 10 percent more on green or sustainable products. Together with Millennials, Generation Z are the most probable to make purchasing commitment based on values and principles which are personal, social, and environmental concerns.

Thus, most of the research papers were not surveying on the youngest generation which might be the cause of marginal impact of previous studies.

Moreover, to support green logo effect the results of fMRI investigation showed the positive effect on customer preferences. The authors examined that a green logo caused the brain activation founded in the ACC area, which relates to raising attention and emotional awareness. In other words, it is claimed that a green logo increases consumers' preference for green fashion products (Lee, et al., 2019).

Summing up, in the presented research papers and empirical evidence social nudging instrument, mainly ecolabelling showed positive impact on influencing pro-environmental behavior thought conscious customers. To answer the first sub-question of this paper, the first hypothesis is as follows:

Hypothesis 1. *The social nudge leads to higher sustainable preference than no nudge.*

2.4.2 The Informal Intervention

One of the primary ways to persuade consumers to take pro-environmental actions is to provide information on desirable behaviors and their consequences (White, Habib, & Hardisty, 2019). Again, the SHIFT framework mentioned informational intervention as a crucial factor named as feelings and cognition. The researchers of the framework referred to system 1 and system 2 (Kahneman, 2011) described before, where the consumers are affected by feelings (system 1) and by cognition (system 2). They explored that education and knowledge are corresponding to higher responsiveness to environmental interest and engagement in pro-environmental behaviors. In general, providing information why the product is sustainable can be essential in raising awareness as well as willingness to pay (White, Habib, & Hardisty, 2019)

First, the research suggested to use framing to nudge the behavior (White, Habib, & Hardisty, 2019). Framing information as a psychological effect is based on the aversion of loss. As discussed, it can be used to frame message, information, commercial and others in order to encourage sustainable choices (Meske & Potthoff, 2017). Additionally, the psychological effect can be used to combine the information to build the major impact by. Yet, the loss-framed information has been proven to influence the behavioral change the most while the information is specific on how to engage in the behavior (White, Habib, & Hardisty, 2019).

Moreover, in the empirical evidence was noted that framing sometime was proposed without solid backing theory and the terminology sometimes led to uncertainty (Jesse & Jannach, 2020).

Second, the empirical evidence highlighted priming as psychological effect with stronger theoretical background, also used towards sustainable behavior in the fashion industry. On the whole, priming *refers to placing cues within the environment to influence people's subconscious behavioral responses* (Wee, Choong, & Low, 2021). Such technique is referring to system 2 (Kahneman, 2011) that is implicit, non-conscious memory where the processing of the target stimulus is modified on purpose by the previous presentation of another specific stimulus (Bauer & Schedl, 2017).

In pro-environmental context priming messages or cues can by displayed variously. Yet, the goal is to unlock the subconscious by triggering the action when reaching the targeted behavior (Wee, Choong, & Low, 2021).

Priming has been researched toward sustainable fashion consumption in fMRI investigation by Eun-Ju Lee and colleagues (Lee, et al., 2019). The environmental message was used as an example as priming, more specifically a short, animated video was presented to the participants during fMRI experiment. Then, the second video was showed to test the green logo effect in the same study. The message priming effect showed impact on improving consumers' preferences for fashionable products. Moreover, individuals who received environmental priming messages prior to product choice showed significant activity in the parietal and occipital areas of the brain and bilateral language corner, which are associated with relational reasoning (Lee, et al., 2019).

The results concluded that priming messages increase consumers' preferences for sustainable fashion products. The presented research leads to the second hypothesis:

Hypothesis 2. *The informal nudge leads to higher sustainable preference than no nudge.*

2.5 Assortment size

Product assortment is one of the most significant tools for retailers to sustainable differentiate and gain competitive advantage (Gazquez-Abad & Martinez-Lopez, 2014). For marketers the decision of assortment size is complex due to various factors of customers preferences. Furthermore, a diverse product assortment can offer many benefits, such as increasing the likelihood of satisfying varied consumer tastes, perceived freedom of choice and decision flexibility for the customers (Koelemeijer & Oppewal, 1999). Yet, such decision is also associated with the possibility of information overload when the cognitive resource is overloaded with product comparisons (Iyengar & Lepper, 2000).

Again, maximizing mindset has found to be more difficult for customers or in general choosers to commit any choice.

The increasing impact of assortment size on consumer's decision-making process is a current topic of discussion for researchers. Yet, the prior research showed that offering large or small choice set have showed mixed effectiveness on the purchase decisions and likelihood (Gao & Simonson, 2016).

The study by Leilei Gao and Itamar Simonson was testing the how likely is to consumer make trade-offs between the perceived costs and associated with a large choice set benefits. The positive relationship between increasing assortment size and impact on respondents purchase likelihood was noticed. Importantly, it was observed that initial decision underline on "whether to buy" rather than on "which option to choose" (Gao & Simonson, 2016).

Research by Chernev and Hamilton (2009) finds that customer preference for a larger choice set is likely to be subject to diminishing profits. The process occurs when the assortment size is increases, then the marginal benefit of each option is decreased.

Yet, one of the research questions of this paper is how the size of an assortment influence nudging effectiveness toward sustainable fashion consumption. As already explained, nudging aims to change behavior using choice architecture that changes small elements in the environment (Thaler & Sunstein, 2008). Both nudging instruments, social and informal nudges are interfering the customers decision making process (Kahneman, 2011). The assortment size seems to be moderator for nudging towards sustainable fashion consumption because the majority of customers shows the positive behavior towards sustainability implementation in the fashion industry, yet this does not mean that consumers are eliminating fast fashion items totally (Pereira, Carvalho, Dias, Costa, & António, 2021).

First, the nudging is shaping the behavior and decision making of groups or individuals (Sunstein, 2013), the same as decision difficulty. While having trouble in making choices among variety of products, their attributes must conflict with each other to make the trade-offs between different alternatives (Luce, Payne, & Bettman, 1999). Recent research presented the effects of decision difficulty on decision-making process. The large choice set of products can affect difficulties in handling the person's conscious mind (Dijksterhuis & Nordgren, 2006).

Next factor is that customer that are being nudged are immediately exposed to multiple stimuli, such as price and various product features. Then, there is also a nudging stimulus that influence the process.

In the previous findings of FMRI investigation, the display of social nudges has increased the attention and emotional awareness of a specific product (Lee, et al., 2019). Moreover, the effect of social nudges is to influence perception of the freedom to carry out it and threat to that freedom. Making a choice from a large set of products requires multiple product comparisons, which can exhaust cognitive resources and cause information overload (Gao & Simonson, 2016).

Moreover, it has been researched while facing too many options, the customers experience negative emotions and psychological burden. More choice takes more time and effort to process which and increases the likelihood to make wrong decisions and regret it (Chernev A. , 2003). The goal of nudging is to make the decision process easier for the customer and to help them making better decisions for them and the society (Ozdemir, 2019). Even thought, the effect of assortment size on nudged product has not been researched yet, the negative emotions of justifying the choice might decrease the effect of nudging.

In the further study, Cherney (2003) demonstrated that larger assortments shift the consumer's ideal points in a way that leads to greater choice difficulty. The implication of large choice set enhances the customer's expectations of finding the ideal option in the available assortment (Diehl & Poynor, 2010).

On the contrary, when the small assortment size occurs it led to increasing satisfaction of purchased product by decreasing cognitive complexity (Sethuraman, Gázquez-Abad, & Martínez-López, 2022).

Prior research has described 'choice overload' as a dilemma in which the complexity of a given situation exceeds the cognitive resources of the decision-maker (Simon, 1955). The effects of too much choice are mainly negative that has consequences for psychological state of consumer (Lane, 2010). As a number of choice increases, the differences between attractive options are decreasing, causing anxiety about not being able to choose any of them (Fasolo, McClelland, & Todd, 2017).

The newest empirical findings indicate that choice overload leads to dissatisfaction, postponement of choice and decision fatigue (Chernev, Böckenholt, & Goodman, 2015). The effectiveness of nudging toward sustainable product might be higher because while the small assortment size will be displayed, the customers will perceive it as a higher quality store (Chernev & Hamilton, 2009). Research showed that consumers tend to care more about assortment option attractiveness than assortment size (Sethuraman, Gázquez-Abad, & Martínez-López, 2022).

While the customers are nudged by social norms instruments, they are also positively stimulated by small choice set that is decreasing the choice overload.

Hypothesis 3. *The sustainable preference for social nudged product is higher for smaller assortment size.*

Furthermore, the informal nudge stimulates the customer awareness by presenting education messages. On the contrary to social nudge, it is not affecting the emotional level but the implicit, non-conscious level of processing information (Kahneman, 2011). While displaying the informal nudge, the system 2

is triggered to process the information. Adding even more choice to nudging process might lead to the increased cognitive complexity of the decision process that might cause customer dissatisfaction.

In addition, as explained in the fMRI experiment on testing the priming message effect, the informal nudge is associated with activating the part relational reasoning part of the brain. Relational reasoning is the cognitive process of linking distant information by finding a common thread connecting them. Such process of filling a logical gap in each context is increase coherence and restore psychological balance. By using relational reasoning, individuals can combine disparate pieces of information together so that a holistic meaning emerges. Which means that while being nudged by the environmental message, customer can make an induvial conclusion about the information they acquired earlier (Lee, et al., 2019).

The choice set might interrupt the action of nudging because it will be another information to process whether it is small or larger assortment. In this case, the smaller assortment size might be more effective than larger assortment size on sustainable preferences because the smaller choice set might decrease cognitive complexity that is necessary to process the informal cue (Fasolo, McClelland, & Todd, 2017). What is more, it might increase the effect of nudging toward sustainable preferences because the displayed information will be triggered directly to the desired behavior and limit interruption with other stimuli.

Hypothesis 4. *The sustainable preference for informal nudged product is higher for smaller assortment size.*

2.6 Hypothesis overview

Hypothesis	
Hypothesis 1	The social nudge leads to higher sustainable preference than no nudge.
Hypothesis 2	The informal nudge leads to higher sustainable preference than no nudge.
Hypothesis 3.	The sustainable preference for social nudged product is higher for smaller assortment size.
Hypothesis 4.	The sustainable preference for informal nudged product is higher for smaller assortment size.

Figure 3 Hypothesis overview.
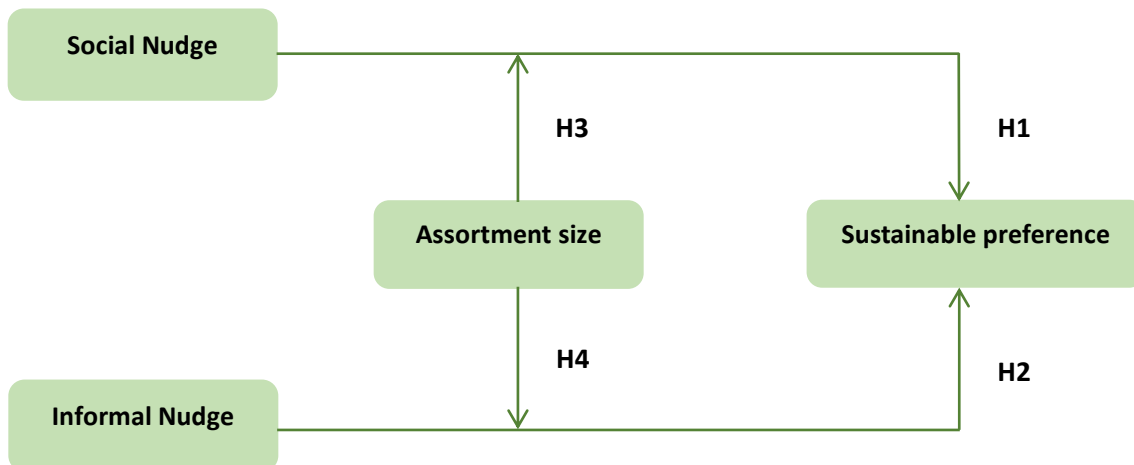
2.7 Conceptual framework

Figure 4 Conceptual framework

3. Methodology

Chapter 3 outlines the methodology used in the study to answer the research questions. First, the research design will be briefly presented, including the research methodology. Further, all the variables in the model are explained, presenting how they will be measured and containing moderating effects. To underrating the process of the experiment, the data analysis and collection will be presented in the final part paragraphs.

3.1 Research design and methodology

The aim of this study is to determine the impact of assortment size on the relationship between digital nudging and sustainable preference. To answer the research questions, it is necessary to test the hypotheses proposed in the previous chapter and to identify relationships. The effective data collection is crucial for creating an accurate research design and enables valid conclusions to be drawn (Toshkov, 2016). According to literature review, the study attempts to find a cause-and-effect relationship using an experimental approach (Malhotra & Birks, 2007).

For the purpose of this study, the 3x2 between-design will used in the form of online experiment. The use of a quantitative method makes it easier to determine the influence of different factor where each participant of an is exposed to only one treatment (Charness, Gneezy, & Kuhn, 2012). The significant advantage of between-subject design is the fact that it decreases the likelihood of triggering a demand effect when the participant "interprets the experimenter's intentions and changes their behavior accordingly". To test nudging when individuals are influences unconsciously, the potential of a demand effect will be even lower (Charness, Gneezy, & Kuhn, 2012).

The online experiment is designed on online survey platform Qualtrics. The advantages of an online experiment include low costs, access to a wider population and the possibility to collect a large set of data in a relatively short period of time. Moreover, it avoids potential bias in the responses given by participants (Paolacci & Chandler, 2014).

In the experiment, participants will be exposed to an artificial shopping platform. The non-sustainable and sustainable products will be randomly displayed. To avoid external biases, only one type of clothing (t-shirt) will be presented on the survey interface.

The main group of respondents will be younger generation, which is generation Z that was born between 1997 to 2012 (McColl & Ritch , 2020). Such group will become a reference group for younger generation

to identify their preferences. Younger generations have been chosen for this research because they are more environmentally educated and socially conscious about climate change comparing to other age groups which means (Pereira, Carvalho, Dias, Costa, & António, 2021). Research showed that having consumers aware will allow improvements to be made more quickly. Moreover, the customers sustainable attitude is a challenge for companies to work on (Shen & Dickson, 2001). Yet, for the purpose of this study the chosen target group will be eco-concern respondent from younger generation.

The research will include following variables:

Independent variable	Social Nudge Informal Nudge No nudge
Dependent variable	Sustainable preferences
Moderating variable	Assortment size small Assortment size large

Figure 5 The variables of the study.

Participant will be exposed to nudging instrument or no nudge at all. Specifically, the study will include two condition groups and one control group.

Control group will be presented the non-sustainable and sustainable products and asked about their preferences. No nudging will be used to understand the participants decision with others. Treatment group will be randomly assigned to answer different forms of the survey. In the first part of the survey, both social nudge and informal nudge will be used to influence the preferences. Then, the second part will display choice set, both small and large to both of nudging instruments. The participant will be asked again the same questions about their preferences.

The conditions groups are as described below.

	Control	**Social Norm Nudge**	**Informal Nudge**
Small assortment size	Condition 1 Survey 1	Condition 3 Survey 3	Condition 5 Survey 5
Large assortment size	Condition 2 Survey 2	Condition 4 Survey 4	Condition 6 Survey 6

Figure 6 The experiment conditions.

3.2 Measures

3.2.1 Independent variable

In the previous section, two nudging instruments showed the positive effect on sustainable preferences. They are relatively easy to implement in the online experiment which is relevant for the outcome of the study. Moreover, they need to be easily accessible for managerial relevance that could adopt such elements on their online retail stores.

Social Nudge

Literature review showed that the social norm is highly relatable to all personal characteristic, where the higher sustainable preferences were observed in the younger generations (Pereira, Carvalho, Dias, Costa, & António, 2021). Moreover, the eco labels showed a positive effect on consumers who are already socially conscious (Shen & Dickson, 2001).

To increase the effectiveness of a social nudge, the target group will be generation Z. The social nudge will be realized by the eco-label that relates to sustainable relatability of high school students (Grunert, Hieke, & Wills, 2004); (Pereira, Carvalho, Dias, Costa, & António, 2021). The goal is to influence participant behavior by comparing their own choice to the reference groups which are the young adults at the same age, preferences, and beliefs. Next, the goal is to modify their choices toward sustainable products. The eco-label will be displayed next to suitable products.

Figure 7 The eco label - social norm nudging example.

Informal nudge

The environmental message showed positive effect on willingness to pay toward for sustainable fashion products (Lee, et al., 2019). The goal is to unlock the subconscious by triggering the action when reaching the targeted behavior (Wee, Choong, & Low, 2021). The informal nudge will be displayed as the

informational banner about sustainable manufacturing. It will inform about water waste and CO2 emission comparing the production of fast fashion item and sustainable manufactured product.

The banner will be displayed on the top of the survey interface, so the participants will be nudged first. Then the products from both, fast fashion and sustainable brands will be displayed to test the preferences towards sustainable products.

WHAT'S THE ENVIRONMENTAL FOOTPRINT OF PRODUCTION
REGULAR COTTON VS ORGANIC COTTON?

Organic cotton releases up to **46% less CO2** comparing to regular cotton.

Organic cotton uses **91% less water** than regular cotton.

Organic cotton has been found to use **62% less energy.**

No chemicals, fertilizers or pesticides to produce organic cotton.
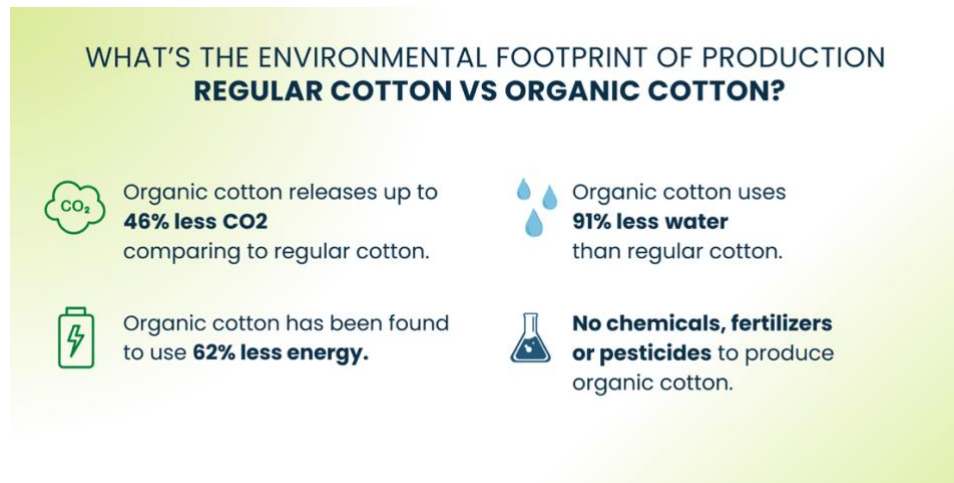
Figure 8 The banner - informal nudging example.

3.2.2 Dependent variable

Sustainable preference

The sustainable preference is the key variable of the study. In the survey, the participant will be asked to choose between fast fashion item and sustainable brand item. The sustainable preference will be measured by the percentage of participants choosing the sustainable manufactures products. The percentage of consumers choosing ecofriendly products in both groups will be compared with the same percentage in the control group.

For the purpose of this study, the survey interface will be used to present the products. The names of the brand clothing will be removed to not trigger participants in any additional way.

Sustainable preferences are affected by many features of the products such as the price, brand, color. To reduce errors in the experiment, only one group of clothing products will be used. Specifically, only t-shirts will be presented in the same color to the participants. Products will be displayed randomly, yet those from sustainable brands will be marked as *'sustainable materials'* to distinguish products on the interface. More specially, the sustainable t-shirt will be marked as made from *'organic cotton'* and the

non-sustainable option is *'regular cotton'.* Additionally, all the products will be in the unisex section, so the participants will not be confused about the gender while deciding. Price will be change differently for various products, yet it will be always higher for organic cotton products.

Control group will test whether the suitable preferences are higher or lower while being nudged or not. The non-sustainable and sustainable products will be displayed randomly, and participants will be asked about their preferences.

The treatment groups will test whether the nudging instruments influence the sustainable preference. The ecolabels and environment messages will be added to the interface of shopping platform in the first part of the survey. Then, the respondents will be asked which product they prefer.

REGULAR COTTON
UNISEX T-SHIRT
19€

ORGANIC COTTON
UNISEX T-SHIRT
29€

Figure 9 Regular and organic cotton T-shirts presented

3.2.3   Moderator

Assortment size

The second part of the survey tests the moderating effect of assortment size on the relationship between nudging instruments and sustainable preferences. To test the hypothesis, the experiment will first display either small or large choice to participants in the treatment groups.

Previous studies have tested the effect of a 'small' assortment set having between 3 and 6 choices and a 'large' assortment set having between 12 and 24 choices (Iyengar & Lepper, 2000); (Koelemeijer & Oppewal, 1999)*;* (Fasolo, McClelland, & Todd, 2017). For the purpose of this study, to perform the most suitable and optimal number of products to choose form, the assortment sizes on the artificial shipping platform will be sized as follows:

- A small online assortment set size with four product choices.
- A large online assortment set size with sixteen product choices.

After displaying the choice set, the respondents will be asked the same questions about product preferences to test how it moderates the relationship between nudging and sustainable preferences.

Figure 10 Small choice set with social nudging example

Manipulation check

To support the outcome of moderator and variables, some extra questions will be asked. First, both of nudging variable will be prompted by manipulation questions. The group of participants that will be presented eco label will be asked question if they have noticed the label. Then, to support the norm-nudge which measure whether participants identify with the reference group or not. The statement *"I identify myself as a part of Generation Z"* will be tested on the 7-point Likert Scale where 1 = strongly disagree and 7 = strongly agree. The second group of participants that will be presented an informal banner will be asked the same question if they have seen the banner. Then, to deeply understand the informal nudge the question about emotions will be displayed. The participant will be choosing from six different emotions: happiness, sadness, surprise, fear, anger, disgust (Van den Broek, 2013).

Then, due to the reason that the moderator of the experiment has showed mixed effectiveness on the purchase decisions and likelihood (Gao & Simonson, 2016) some additional questions will be displayed. To

better understand the participants behavior the participant will be asked about the perceived variety of the assortment, to test whether the underlying stimuli manipulation was successful. Based on prior research on choice overload (Iyengar & Lepper, 2000) the question will be based on the by a 7-point Likert-scale it was asked whiter the displayed assortment was 1. I has too little choices and 7. I had too many choices.

Next, to measure to complexity of the task a manipulation check will be added in which the participant will be asked question how easy or difficult it was to decide which product do they prefer. The 7-point Likert scale will be used to measure, 1. Not difficult at all and 7. Very difficult. The same for the easy question where 1. Not easy at all and 7. Very Easy (Fasolo, McClelland, & Todd, 2017).

Again, the significant factor that moderates the behavior is choice overload. To understand the differences between small and large choice set preferences some extra questions were added to the survey. The choice satisfaction of chosen alternative is an important measure of choice overload where the participant feels confident of their decision (Chernev, Böckenholt, & Goodman, 2015). Two questions will be asked in the 9-point Likert scale, first *"How satisfied with your choice are you?"* and *"How satisfied would you be if you actually received this product?"* (Greifeneder, Scheibehenne, & Kleber, 45-50).

Finally, the to further identify the effects of choice and information overload, participants were asked to rate the same three items on a 7-point Likert for each condition. Question based on the Stanton (2012) study was implemented in the survey. Participants were showed three different statements whether "I feel overwhelmed by the variety of options available", "I have a hard time keeping up with the given information" and "I feel overwhelmed by the amount of available information". Additionally, the attention check was added in the section.

3.2.4 Control variables

Finally, although an online laboratory experiment was chosen as the research method to test the hypotheses, it is not possible to control for all factors that could influence the effect of nudging and choice set on sustainable preferences. The following control variables were included because of their ability to induce variability in option choice.

Age of the participants

The target group of the study is younger adults, but the online experiment will be distributed online which might lead to some errors.

To make sure that the main respondents will be at age 18 to 25, the results of the online experiment will be controlling the age of participants.

Gender

There is not a lot a data about gender differences found in studies on choice overload. Yet, a recent study on choice overload examines the difference on women and men perceived effects (Ren, 2014). To address this contrast in women's and men's perceptions of choice overload, this study considers the impact of gender.

Education background

The level of education is included to better understand the decisions of respondents. The research showed that higher level of education positively influences sustainability awareness (Vladimirova & Le Blanc, 2016).

3.3 Data collection

The survey has been prepared in Qualtrics to provide the high-quality user experience to limit the risk of perception errors. Then, the collected data from this study will be imported into SPSS to further analyze the acquired data.

The survey was distributed from 7th of July to 17th of July, for a total duration of 10 days to complete the online experiment.

The survey has been spread through the most popular social media platform such as Facebook, Instagram, and WhatsApp to reach the target group of Generation Z. Moreover, the survey was shared on the Facebook groups mostly moderator by young people.

3.4 Survey structure

The survey consisted out of three components: an introduction, online shopping interface, and the final questionnaire. First, the introduction message is shown to all the respondents to understand the purpose of the study.

In the second part is randomly displayed between six groups of respondents. Meaning that the social, informal nudging or no nudging at all is introduced in form of ecolabel or banner. Then, two t-shirt of sustainable and non-suitable materials is showed in the different prices. Participants are asked which product they prefer to buy.

To the third part participants are randomly assigned. No matter which product do they choose in the first section, they will be assigned to small or large choice set. The choice set is expanded from four options to sixteen products. The sustainable and non-sustainable t-shirts are displayed randomly on the interface of the survey. Participant are asked again about product preferences and assortment size.

The fourth part of the survey was the same for all the respondents that were asked to express their opinion about the small or large choice set. Then, they were asked two question whether it was easy or difficult to decide about which product do they prefer. Lastly, the questions about choice satisfaction and attractiveness were displayed.

The last part is again the same for all groups and will ask some questions about age, gender, and education background to test the control variables. In this part the respondents will thanked for anticipating.

To present the structure of the survey, the figure 11 is presented below.
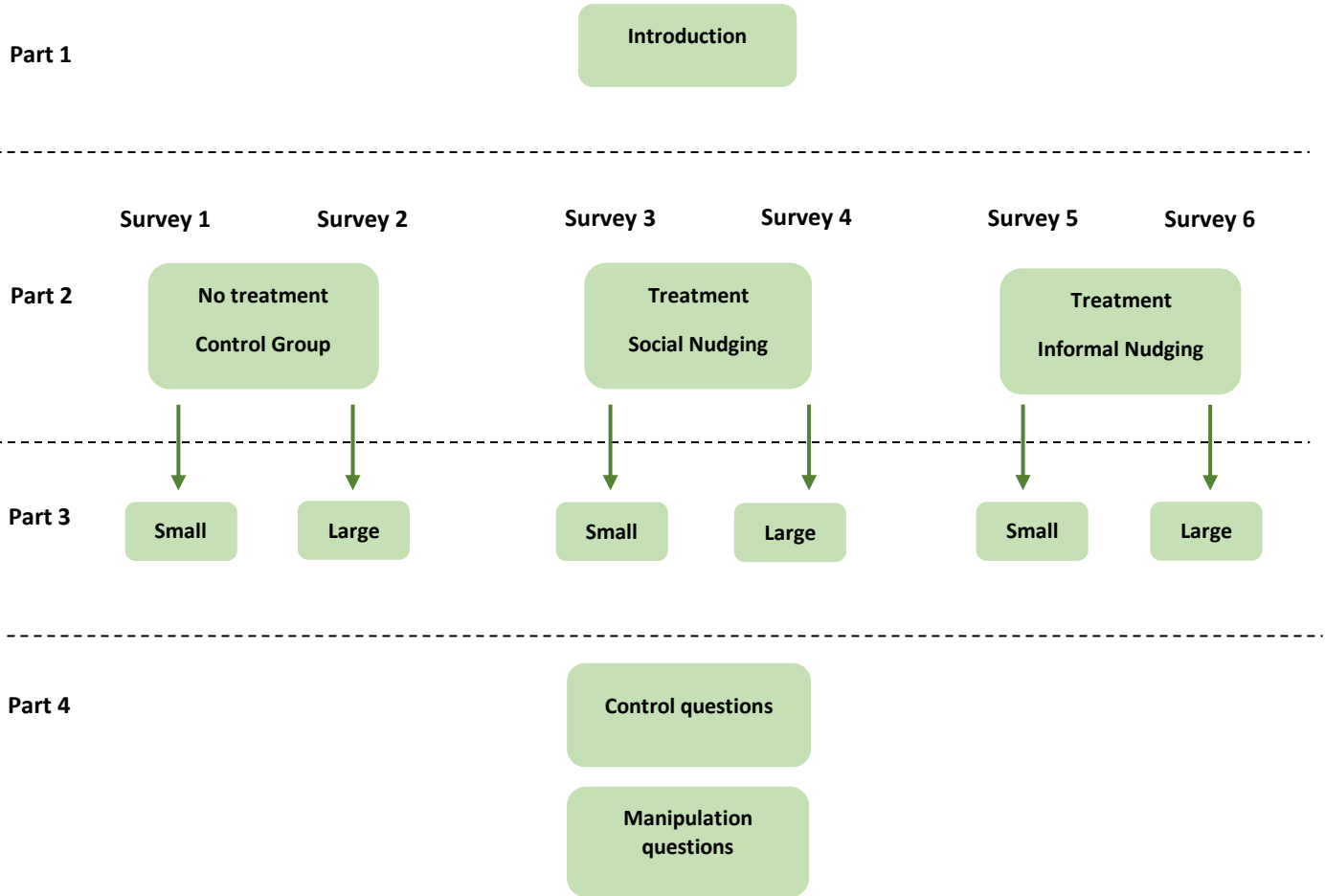
Figure 11 Survey structure.

3.5 Pre-test

Before starting the experiment, a pre-test was conducted to ensure that all variables in the model were correctly measured using the measurement scales introduced above.

After pre-test, all the biases have been corrected and the final survey has been launched.

The final overview of the Survey can be found in the Appendix A.

4. Results

The section presents the results of the data analysis to test the hypotheses in the conceptual framework. First the process of preparing the data set has been explained. Then descriptive statics and randomization with randomization are introduced. This part is crucial for further analysis. Next, the hypothesis testing is briefly displayed starting with the model of control variables, then the main effect of the study. Finally, moderator effects were included in the analysis to generate a deep baseline test outcome.

4.1 Preparing the data set and recoding variables

The first step to obtain the valid results for the research, it was to prepare the dataset. More specifically, a total of 467 (N=467) respondents has taken part in the survey. Yet only 292 (N=292) has completed the survey, which has resulted in deleting 175 answers. Even though, the recorded data has reached over the minimum of required reposes.

Next, the data set has been cleaned from other invalid response when the attention and manipulation checks were incorrect. Over 55 responses had been filtered out and deleted, when the responded failed to mark a correct answer in the attention check question which was "Attention Check- Please mark Strongly Agree question". Lastly, 13 responses were deleted due to extraordinary time extending 15 minutes to complete the survey. Overall, the final dataset has 224 completed and valid responses.

After cleaning the dataset of incorrect data, some variables needed to be recoded. First, the Qualtrics has automatically coded the variables which ensured almost suitable dataset for further analysis. However, the survey itself was quite complex with 6 different conditions which resulted in creating new, additional variables.

A variable *Condition* that presented the number of conditions for the participants (1=1 condition, the rest as follows). Then, the binary variables have been added for each model. The binary *IV_socialnudging* and *IV_informalnudging* conditions was presenting if the participant was nudged or not (1=nudging, 0=no nudging). The binary DV_ *socialnudging* and *DV_ informalnudging* was a match for sustainable (1) or non-sustainable (0) choice made. The IV and DV labels were computed for easier and clear overview. For testing moderating effect, the variable *asize* presenting whether the small (0) or large (1) choice set was testes in the specific group.

4.2 Descriptive statistics and randomization

Participant were equally distributed across conditions and control groups by Qualtrics set up. Yet, after removing invalid respondents, the distribution across conditions and control group changed. The new distribution of participants is shown in Table 13. Complete information about the demographics can be found in Appendix B.

In the end, after removing invalid data 5 of 6 had around 40 respondents which is significant data to continue the study. The higher number of respondents was noted for social norm nudging treatments for both groups of choice set aiming 41 and 43 responses. Unfortunately, "the informal nudging + large assortment size" condition had only 28 responses. Yet, it will be noted and later explained in the limitations of the study.

	Control Group	Social Norm Nudge	Informal Nudge
Small assortment size	Condition 1 **37 responses**	Condition 3 **41 responses**	Condition 5 **38 responses**
Large assortment size	Condition 2 **37 responses**	Condition 4 **43 responses**	Condition 6 **28 responses**

Figure 12 Final responses per conditions

Next, the sample consisted of 94 (42%) male and 120 (53,6%) female respondents (N=224) where the rest of the participants preferred not to disclose their gender or identify as non-binary/third gender.

In terms of age group, the overrepresentation was of aged between 18 and 24 (133 respondents, 59,4%) which was the purpose of the study to reach mostly the young adults. The second largest group was under 18 (50 respondents, 22,3%), following by aged between 25 and 34 (27 respondents, 12,1%). Lastly, only 10 responses (4,5%) were gathered from 45-54 age group and 4 responses (1,3%) from older than 45.

Consequently, with age groups, the most completed level of education was high school diploma by 96 respondents (42,9%) and Bachler degree by 57 respondents (25,4%). Again, the data is valid on terms of distributing the survey among young generation. Usurpingly, only 2 of respondents had marked a PhD Degree which is less then 1% of total answering. Lastly, the master's degree was marked by 34 respondents (15,2%) similarly to people preferred not to reveal their education level (35 respondents, 15,6%). Next, the randomization of participant has been looking how the participants were distributed. As noted, the conditions gender, age and level of education had been added to the survey for the purpose of the study. The target group was young adults, so there is no surprise that the age randomization is statistically non-significant (p=0.558) same as gender (p=0.688). It can be concluded that there is no association

between gender and age on conditions. Yet, the level of education is significant (p=0.367) meaning that the randomization is statistically significant. All the detailed data can be found in the Appendix B.

4.3 Reliability test

To test the reliability of the study, the Cronbach's Alpha test was conducted. First, three question on choice overload questions were testes because of the same Likert scale measures. A very high value of 0.936 had confirmed that the data is useful for further analysis. Then, questions on the choice satisfaction were tested with the high value of 0.880. As a result, both of question groups are reliable. The data is included in the Appendix C.

	No. of components	The Cronbach's Alpha
Choice overload	3	0.936
Choice satisfaction	2	0.880

Figure 13 The Cronbach's Alpha output

4.4 Variables

Correlation Matrix

The correlation matrix has been performed for the main and moderation effect of the study and showed below. The table is presented below (more in the Appendix C).

	Sustainable_preference	*socialnudging*	*informalnudging*	*asize*
Sustainable_preference	1	.357	.475	-.031
socialnudging	.357	1	-	.012
informalnudging	.475	-	1	-.076
asize	-.031	.012	-.076	1

Figure 14 The correlation matrix

The two independent variables are significant (p=.000; p=.000) and positively correlated with the depended variable, which is sustainable preferences. The moderator variable (*asize*) is significant and positively correlated with social nudging (p=.012). However, the assortment size correlation with independent variable is insignificant (p=.882) same as the correlation with the sustainable preference (p=.645). These measures will be further investigated in the next models and tests.

4.5 Manipulations and control variables

Independent variables

First, before testing the main effect, additional tests on manipulation were run. First, both independent variables questions were supported by the nudging specific questions. Those participants who were nudged by displaying logo of Generation Z was also asked whether they identify as a part of this generation or not. All the detailed data included in the Appendix D.

	regular	organic	total
Strongly disagree	1	2	3
Disagree	1	6	7
Somewhat disagree	1	1	2
Neither agree or disagree	4	4	8
Somewhat agree	9	5	14
Agree	9	31	40
Strongly agree	4	6	10

Figure 15 Descriptive statistics for social nudging

Almost 60% of participants has agreed or strongly agreed to this statement, but importantly 44% of them has chosen the organic T-shirting. The overall trend is that people who were identifying as a Generation Z, were more likely to choose the sustainable option.

Then, participant who were displayed informal nudging were asked a question about identify the emotion that related best to what they feel when looking at the banner.

	regular	organic	total
Happiness	4	16	20
Sadness	1	14	15
Surprise	4	13	17
Fear	4	8	12
Anger	1	1	2
Disgust	0	1	1

Figure 16 Descriptive statistics for informal nudging

Over 26% of participant felt happiness, then almost 24% felt surprised and 21% felt sadness. Different reaction to the banner about organic and regular manufacturing showed mixed emotional impact on the sustainable preferences. Moreover, 22% of participants who felt happy opted for sustainable product, same as 18% of participants who felt surprised and 19% who felt sad.

Manipulations

Choice satisfaction

First, the Chi-Square test was run to check if the choice attractiveness and assortment size are correlated with each other. The results of first question (Appendix D) if the participants are satisfied with their choice analysis showed statically significant (p=.001) correlation same as the outcome of second question about satisfaction if they received the chosen product (p=.001). Conducing, that the choice satisfaction and choice set are correlated.

Then, the linear regression model was run. Even though the regression is significant (p=.000), both of independent variables in the model – *satisfaction_1* and *satisfaction_2* is not statically significant (p.162; p=.153). The overall effect of choice satisfaction on assortment size is not significant.

	B	Std.Error	Beta	t	Sig.
constant	1.872	.095		19.657	.000
satisfaction_1	-.035	.025	-.147	-1.404	.162
satisfaction_2	-.033	.023	-.150	-1.432	.153

Figure 17 Choice satisfaction regression

Choice overload

The Chi-square test performed to measure the correlation between each question and assortment size. After running 3 tests, each of them is statistically significant (p=.000) for the significance level of 5%. Meaning that the assortment size is depended on choice overload.

Then, the linear regression was conducted for all questions and assortment size. The two of the questions are significant (p=.035; p=001) if felt overwhelmed by the amount of information or have a hard time keeping up with the information (*choice_1*; *choice_2*). Conducing, these two variables have positive effect on the choice overload. However, variable about feeling frustrated by the available information (*choice_3)* is not statistically significant (p=.917).

	B	Std.Error	Beta	t	Sig.
constant	.863	.063		13.795	.000
choice_1	-.057	.027	.227	2.123	.035
choice_2	-.102	.030	.393	3.415	.001
choice_3	.003	.026	.011	.104	.917

Figure 18 Choice overload regression

Choice attractiveness

The Chi-Square test was conducted to measure the correlation between choice attractiveness and choice set. Overall, the correlation between variables is statistically significant (p=.000).

The linear regression outcome is significant (p=.000). Moreover, the *attractive* variable is significant (p=.000) and negatively correlated with the depended variable (B=-.105).

	B	Std.Error	Beta	t	Sig.
constant	1.787	.084		21.195	.000
satisfaction_1	-.105	.027	-.254	-1.404	.000

Figure 19 Choice attractiveness regression

Concluding, the larger assortment size is decreasing the choice attractiveness. Moreover, taking into account that the above model is significant, the overall correlation can be detailed.

	small	large	total
Not attractive at all	11	31	42
Not attractive	20	14	34
Neither attractive or not attractive	34	34	68
Attractive	37	27	64
Very attractive	14	2	15

Figure 20 Choice attractiveness crosstab

First, the 23% of participants who were in small choice set treatment group has define the choice set as attractive or very attractive. On the other hand, the 20% of participants who were treated by large assortment size has determined choice as not attractive at all or not attractive. Yet, the majority of responded (30%) could not specify whether the choice was attractive or not. Altogether, the large choice showed negative correlation on choice attractiveness. The above findings will be further investigated in the next sections.

4.6 Hypothesis testing

A binary logistic regression is performed to test the hypotheses which estimates "the probability of an observation belonging to a particular group" (Malhotra & Birks, 2007). To carry out the analysis, the separate variables were placed in 4 different models to show the results of the hypotheses. First, the main effect of nudging towards sustainable preferences. Then, the moderation effect of choice set on the main relationship has been measured.

4.6.1 Main effect model

The analysis will focus on the main relationships of conceptual the model which is nudging and sustainable preference. The analysis has been divided to test two different independent variables of study which are social and informal nudging to test hypothesis H1 and H2. The output and detailed data for this section can be found in the Appendix E.

First, the binary logistic regression was conducted for social nudging (*IV_socialnudging*) and sustainable preference (*DV_socialnudging*).

	B	S.E.	Wald	df	Sig.	Exp(B)
IV_socialnudging	1.500	2,04	,846	1	,000	4.483
Constant	-0.860	1,65	,652	1	,001	0.423

Figure 21 The outcome of main effect model (social nudging)

The above table presents the variables in equation. The overall model tested to be significant ($X2(3)$ = 20.599, p < 0.05 (p = .000)). The Nagelkerke R Square is 0.163 that demonstrates that the control variables explain .304 of the variances of the preference.

The independent variable *socialnudging* is significant and positively correlated with sustainable preference. Meaning that the social nudge condition increases the sustainable preferences compared to no nudge condition, which **confirms the first hypothesis (H1).**

Additionally, the change of odds between treatment group (*socialnudging* =1) and control group (*socialnudging* =0) is 348,3%, meaning that people who are being social nudged are increasing by 348,3% the odds of choosing the sustainable product compared to a people who are not nudged at all.

Secondly, the binary logistic regression was conducted for the second main effect but for different nudging type (*IV_informalnudging*) and sustainable preference (*DV_socialnudging*).

	B	S.E.	Wald	df	Sig.	Exp(B)
IV_informalnudging	2.084	,389	28.769	1	,000	8.036
Constant	-0.860	,254	11.439	1	,001	0.423

Figure 22 The outcome of main effect model (informal nudging)

Again, the overall model is significant ($X2(3)$ = 33.011, p < 0.05 (p = .000)), same as the independent variable in the model. The Nagelkerke R Square is 0.280 which is higher than the previous model but again demonstrates that the control variables explain .280 of the variances of the preference.

The independent variable of the model is significant and positively correlated with sustainable preference **confirming the second hypothesis (H2).**

In this case, the change of odds between treatment group (*informalnudging* =1) and control group (*informalnudging* =0) is even higher than for social nudging group. It means that customers who are being informal nudged are increasing by 703,6% the odds of choosing the sustainable product compared to a customer who are not nudged at all.

Comparing the nudging instruments, the effect of informal nudging is greater than the effect of social nudging on sustainable preferences. The graph below presents the percentage of sustainable preference for regular and organic T-shirt (DV) per conditions.
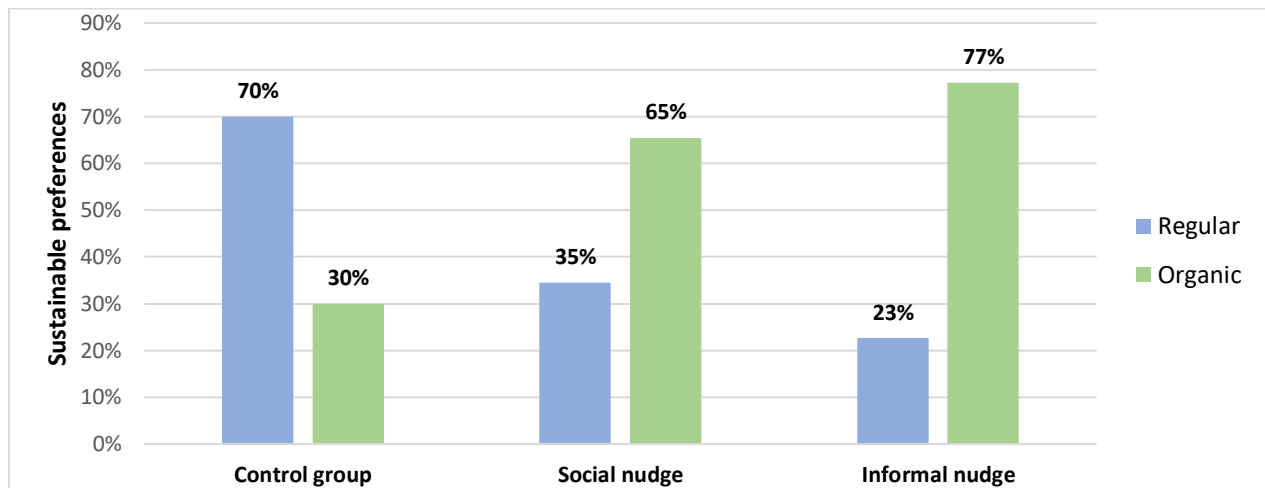
Figure 23 presents the percentage of sustainable preference for regular and organic T-shirt (DV) per conditions.

4.6.2 Moderating effect

The second part of the analysis is concerned on the moderating effect on the main model. This section will be again divided for testing two different independent variables (social and informal nudging).

First, the Hayes Process macro has been used (Hayes, 2022) to measure more interactions analysis. The overall model is significant (p=.0001) same as the independent variable in the model is significant (p=.0039). However, the moderating variable (a_size) is not significant (p=.6114), affecting that the interaction (Int_1) is statistically insignificant (p=.7413) as well. Overall, that indicates that the assortment size is not a significant moderator of the effect of social nudging on sustainable preferences and **the Hypothesis 3 is insignificant.**

	β	se	Z	p	LLCI	ULCI
Constant	-.7340	.3512	-2.0900	.0366	-1.4223	-0.0457
IV_socialnudging	1.3907	.4815	2.8886	.0039	.4471	2.3344
a_size	-.2593	.5103	-.5081	.6114	-1.2594	.07408
Int_1	.2267	.6865	.3302	.7413	-1.1188	1.5721

Figure 24 Coefficients expressed in the log odds ratio (model 3).

Then, the same Hayes Process macro was conducted for the second main model. In this case, the model is statistically significant (p=.000). Yet, the statistical insignificant was found to be independent variable (p=.2042), moderator variable (p=.6114) and the interaction between variables (p=.6212). Concluding that the moderator is not a significant moderator of the effect of nudging instrument, this time informal nudging on sustainable preferences. Overall, the **Hypothesis 4 is insignificant.**

	β	se	Z	p	LLCI	ULCI
Constant	-.4747	.7940	-.5979	.5499	-2.0308	1.0814
IV_informalnudging	1.5155	1.1937	1.2696	.2042	-.8240	3.8551
a_size	-.2593	.5103	-.5081	.6114	-1.2594	.07408
Int_1	.3885	.7862	.4942	.6212	-1.1524	1.9294

Figure 25 Coefficients expressed in the log odds ratio (model 4)

4.7 Overview of the findings

Overall, after conducing all the analyses, the two of the hypotheses are supported and two are insignificant. The overview can be found below.

Hypothesis		
Hypothesis 1	The social nudge leads to higher sustainable preference than no nudge.	**Supported**
Hypothesis 2	The informal nudge leads to higher sustainable preference than no nudge.	**Supported**
Hypothesis 3.	The sustainable preference for social nudged product is higher for smaller assortment size.	**Insignificant**
Hypothesis 4.	The sustainable preference for informal nudged product is higher for smaller assortment size.	**Insignificant**

5. Discussion

The following section will explore what these findings suggest about the conceptual model. The general implications will focus on whether the conceptual model is supported by this study and what the underlying factors may have been that led to the rejection of hypotheses. Next, the managerial and research implications will provide the practical implications of the findings. Finally, an overview of the main limitations, as well as recommendations for future research will concluded the paper.

5.1 Findings

The main goal of the study was to analyze how the digital nudging instrument together the assortment size including the sustainable fashion preferences. As discussed before, the research has measured the main effect of nudging instruments on sustainable preferences. Then, the moderating effect of choice set on the tested relationship. Overall, the direct main model has been supported by performed analysis meaning that both oh nudging instruments has a direct and positive effect on sustainable preferences (H1; H2). Comparing with the control group, the sustainable preference has increased by 35% and 47% for participants in the nudging treatment groups. What is interesting, the informal nudge showed higher effect by 12% on sustainable preferences than social nudging. Yet, both nudging instruments had showed strong positive effect on the sustainable fashion preferences.

The main model was supported by additional analysis about young adults' impact on fashion consumption. The overall tendency is that participants who did identify as a part of Generation Z, were more likely to choose the sustainable product that the non-sustainable product. Subsequently, the outcome showed that both informal nudging and fashion manufacturing reveal different emotions among participants. Intriguingly, the emotions were positive and negative such us happiness, surprise, sadness.

The prior research showed that the young adults are more aware about the climate change are willing to spend over 10 percent more on green products (Deloitte, 2022); (Pereira, Carvalho, Dias, Costa, & António, 2021). However, over 70% of the participants in the study who were not nudge had chosen the non-sustainable product. Meaning that the nudging had been proved to be a significant tool to change behavior of especially young adult.

Based on the positive effect of the main model, the positive effect of the moderator was possible. Yet, the moderating effect occurred to be insignificant for both nudging instruments relationship. It was concluded that the assortment size does not influence the nudging effectiveness toward sustainable fashion consumption (H3; H4). It has been observed that participant who were nudged and treated by small or

large choice set, has not changed their preferences or the number of changes was marginal. Even though the majority of participants has chosen the desirable option, it cannot be established whether they choose it because of being nudged or the effect of choice set. As so, the argue is whether the participants choose the sustainable product purposely or randomly, which leaves the possibility for further research.

Even more, the supporting variables has showed that choice attractiveness has increased choice overload and decreased the choice attractiveness. More specifically, the choice attractiveness has been decreased for 20% of participants who were treated by large choice set. Yet, the correlation between choice overload and choice set might affect the overall decision and insignificant moderation effect. As such, a possible explanation for the lack of moderation effect is choice overload that occurred not in the assortment size treatment, but between nudging and assortment size treatment. Meaning that the participants were only nudged first, which might decrease the cognitive complexity that is necessary to process nudging (Fasolo, McClelland, & Todd, 2017). Then, the participants were nudged twice, additionally with the choice set small or large. The second treatment has triggered the decision-making process, which might lower the cognitive complexity again. Another explanation could be that participant who first had chosen the organic product committed to this decision and even different of assortment size do not has changed their opinion. Such limitation might relate to above discussed study by Leilei Gao and Itamar Simonson (2016) who did describe that initial decision underline on "whether to buy" rather than on "which option to choose". Meaning that the commitment to the first chosen to product that they would decide to buy was stronger than the further decision on other possible options. However, the nudging and assortment size has not been examined cognitive complexity in the literature yet, so the possible explanation are limited.

Overall, the even though the moderation effect was not significant, the main effect of nudging towards sustainable fashion preferences is positive and strong. Interestingly, the research has confirmed that the youngest generation is showing high sustainable fashion preferences while being nudged, which direct relation was not tested before in the previous studies. These findings present the impact of nudging in the online consumption, especially among younger generations.

5.2 Managerial and Academic Implications

The results of the study can provide relevant insights for managers who operating in e-commerce, especially in the online sustainable consumption. The study increased the awareness about the nudging which a relevant tool in the e-commerce industry. In the past, nudging instruments were used mostly in the offline settings but now the effectiveness of online implementation has been proved to be significant. Furthermore, this study shows that the nudging influence decision-making process in online settings and

on the relevantly new topic which is sustainable fashion consumption. As noted, before, the green marketing is positively impacting on the purchase probability, willingness to pay and positive perception of the company (White, Habib, & Hardisty, 2019); (Kotler, Kartajaya, & Setiawan, 2010). The nudging instruments can be used as a part of the green marketing strategy that educates and increases awareness of the consumers about sustainable manufacturing and production.

Moreover, the outcome of the study has showed the while generation Z is being nudged, they prefer the organic products rather that regularly manufactured products who are significantly less eco-friendly. The e-commerce brands and companies can use nudging as an opportunity to promote they brands and increases sales by implementing the tool. What is more, the social and informal nudging showed the strong positive relationship on the suitable preference and are easy to implement in the e-commerce. Especially when using good UX and UI design that will not lead to many interruptions between users and the interface, so the nudging instruments will be properly performed.

For academics the results of the study are relevant especially in the field of behavioral economics and studies. First of all, the field of sustainable fashion preferences has not been promptly discovered yet. Mostly because the topic is objectively new and constantly evolving. Even thought, it has been claimed that nudging can be a used to change the behavior of younger generation in terms of sustainability. Secondly, the research showed that for this age group informal nudging do not have to be connect with only positive emotions. The boundaries of emotions are extended in terms of people who are nudged. Such discovery is significant for further research of both nudging and emotions correlated with the organic products. Following, when it comes to moderating effect and assortment size, the research has provided a potential for future researchers to test what other factors might affect the effectiveness of nudging instruments. Then, the assortment size as a moderator had showed to increase choice overload and decrease the choice attractiveness. Yet, for further possible research the experiment must be extended to whether the relationship will change. Meaning that the assortment size might be the moderator but not for the depended variable such sustainable preferences.

5.3 Limitations and Future Research Suggestions

The last paragraphs will finalize the study by focusing on limitations as well as suggestions for future research. It can be considered a limitation that this study only focused on the assortment size effect as a moderator on the relationship of nudging and sustainable preference. The main limitation of the study was the insignificant outcome of the measured moderation effect meaning that no further research and analysis could be performed. The described before research by Leilei Gao and Itamar Simonson (2016)

might be the answer why the participants of the study were not affected by the assortment size. The study resulted that the initial decision might underline on "whether to buy" rather than on "which option to choose" (2016). This idea is a potential explanation and at the same limitations for further study because if the consumer had doubts at the first place, the smaller or larger choice option will not affect the overall decision. As such, the research gap itself is a suggestion for further researchers to discover.

Next, the limitation of the study was the assortment size itself which is a relatively not well and precisely research yet. The literature does examine assortment size as a significant factor in customer preferences, but the number of papers is limited, especially does who focus on the online environments. Which leads to other limitations, that is the constantly changing and evolving e-commerce industry. The Covid-19 was one of the reasons to expand the shopping online behavior, so the shopping platforms has changed their interfaces, design as so the assortment. The research gap is that we do not know the direct effect of these changes on customer preferences.

Furthermore, the last limitation of the study was the mentioned before choice overload and choice attractiveness variables as a supporting question to assortment size effect. The choice set effect is moderated by many factors but those were research to be the most significant. However, the choice attractiveness and choice overload showed correlation with the assortment size. Yet, the supporting questions was not enough to understand the behavior of the participants. So, for the further study, the research should focus on

Lastly, the limitation of study that might also affect the insignificant moderation effect was conducting the online experiment. The Qualtrics platform do not perform other methods such as eye tracking or mouse tracking analytics to deeply understand the behavior and decision-making process of participants. After the study, what is unknown how participants made the decision while having choice overload. The outcome cannot predict whether participant was marking random answers or not in the moderation treatment. For further research suggestion, performing eye tracking and mouse tracking analysis of the same study might give more insight about the participants behavior. As so, such methods would be give precise outcome for the unknown actions and decisions.

References

Angrist, J. D., & Pischke, J.-S. (2015). *Mastering 'Metrics: The path from cause to effect.* Princeton: Princeton University Press.

Assortment size and option attractiveness in consumer choice among retailers. (n.d.).

Bauer, C., & Schedl, M. (2017). Introducing surprise and opposition by design in recommender systems. *Proceedings of the 25th conference on user modeling, adaptation and personalization*, (pp. 350–353). Bratislava.

Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior & Organization*, pp. 1-8.

Chernev, A. (2003). When More Is Less and Less Is More: The Role of Ideal Point Availability and Assortment in Consumer Choice. *Journal of Consumer Research* , pp. 170-83.

Chernev, A., & Hamilton, R. (2009). Assortment Size and Option Attractiveness in Consumer Choice Among Retailers. *Journal of Marketing Research*, 410-420.

Chernev, A., & Hamilton, R. (2009). Assortment Size and Option Attractiveness in Consumer Choice among Retailers. *Journal of Marketing Research*, pp. 410-420.

Chernev, A., Böckenholt, U., & Goodman, J. (2015). Choice overload: A conceptual review and meta-analysis. *Journal of Consumer Psychology*, pp. 333-358.

Cialdini, R., & Goldstein, N. (2004). Social Influence: Compliance and Conformity. *Annual Review of Psychology*.

(2020). *Climate Change and Land:An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.* International Panel on Climate Change.

Deloitte. (2022). *The Deloitte Global 2022 Gen Z & Millenial Survey.*

Demarque, C., Charalambides, L., Hilton, D., & Waroquier, L. (2015). Nudging sustainable consumption: The use of descriptive norms to promote a minority behavior in a realistic online shopping environment. *Journal of Environmental Psychology*, 166-174.

Dhir, A., Sadiq, M., Talwar, S., Sakashita, M., & Kaur, P. (2020). Why Do Retail Consumers Buy Green Apparel? A Knowledge-Attitude-Behaviour-Context Perspective. *Journal of Retailing and Consumer Services*.

Diehl, K., & Poynor, C. (2010). Great Expectations?! Assortment Size, Expectations, and Satisfaction. *Journal of Marketing Research*, pp. 312–322.

Dijksterhuis, A., & Nordgren, L. F. (2006). A Theory of Unconscious Thought. *Perspectives on Psychological Science.*

Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R., & Vlaev, I. (2012). Influencing behaviour: The mindspace way. *Journal of Economic Psychology*.

(2021). *Fashion eCommerce report 2021.* Statista Digital Market Outlook.

Fasolo, B., McClelland, G. H., & Todd, P. M. (2017). Escaping the tyranny of choice: When fewer attributes make choice easier. *Marketing Theory*, pp. 13-26.

Gao, L., & Simonson, I. (2016). The positive effect of assortment size on purchase likelihood: The moderating influence of decision order. *Journal of Consumer Psychology*, 542–549.

Gazquez-Abad , J., & Martinez-Lopez, F. (2014). Estimation of Product Category Sales' Responsiveness to Assortment Size. *National Brands and Private Labels in Retailing*.

(2021). *Global Ecommerce Forecast.* Insider Intelligence, eMarketer.

(2021). *Global Sustainability Study 2021.* Simon Kurcher & Partners.

Grunert, K. G., Hieke, S., & Wills, J. (2004). Sustainability labels on food products: Consumer motivation, understanding and use. *Food Policy*, 177-189.

Hankammer, S., Kleer, R., & Piller, F. (2020, October 15). Sustainability nudges in the context of customer co-design for consumer electronics. *Journal of Business Economics*.

Hansen, P. G., & Jespersen, A. M. (2013). Nudge and the Manipulation of Choice A Framework for the Responsible Use of the Nudge Approach to Behaviour Change in Public Policy. *European Journal of Risk Regulation*, 3-28.

Hummel, D., & Maedche, A. (2019). How effective is nudging? A quantitative review on the effect sizes and limits of empirical nudging studies. *Journal of Behavioral and Experimental Economics*.

Iyengar, S. S., & Lepper, M. R. (2000). When Choice is Demotivating: Can One Desire Too Much of a Good Thing? *Journal of Personality and Social Psychology*.

Jesse, M., & Jannach, D. (2020). Digital nudging with recommender systems: Survey and future directions. *Computers in Human Behavior Reports*.

Kahneman, D. (2011). *Thinking, Fast and Slow.* London: Penguin Books.

Koelemeijer, K., & Oppewal, H. (1999). Assessing the effects of assortment and ambience: a choice experimental approach. *Journal of Retailing*, 319-345.

Kotler, P., Kartajaya, H., & Setiawan, I. (2010). *Marketing 3.0: From Products to Customers to the Human Spirit.* Hoboken: NJ: John Wiley & Sons.

Lane, R. E. (2010). The Loss of Happiness in Market Economies. *Yale University Press*.

Lee, E.-J., Choi, H., Han, J., Kim, D. H., Ko, E., & Kim, K. H. (2019). How to "Nudge" your consumers toward sustainable fashion consumption: An fMRI investigation. *Journal of Business Research*.

Luce, M. F., Payne, J. W., & Bettman, J. R. (1999). Emotional Trade-Off Difficulty and Choice. *Journal of Marketing Research*, pp. 143–159.

Malhotra, N., & Birks, D. (2007). *Marketing Research: an applied approach: 3rd European Edition.* Harlow: Pearson Education.

Mandaric, D., Hunjet, A., & Vukovic, D. (2022). The Impact of Fashion Brand Sustainability on Consumer Purchasing Decisions. *Journal of Risk and Financial Management*.

McColl, J., & Ritch , E. (2020). Brand Purpose: Perspectives and Purchase Behaviour of Generation Z: An Abstract. *Enlightened Marketing in Challenging Times. AMSWMC 2019. Developments in Marketing Science: Proceedings of the Academy of Marketing Science.*, 363–364.

Meske, C., & Potthoff, T. (2017). The DINU-Model - a process model for the design of nudges. *25th European conference on information systems* (pp. 2587–2597). ECIS.

Moorhouse, D. (2020). *Making Fashion Sustainable: Waste and Collective Responsibility.* West Yorkshire: One Earth.

Ofstad, S., Westly, L., & Bratelli, T. (1994). Symposium: Sustainable Consumption. Oslo: Norwegian Ministry for the Environment.

Ozdemir, S. (2019). Digital nudges and dark patterns: The angels and the archfiends of digital communication. *Digital Scholarship in the Humanities*.

Paolacci, G., & Chandler, J. (2014). Inside the Turk: Understanding Mechanical Turk as a Participant Pool. *Current Directions in Psychological Science.*

Paul C. Stern, L. K. (1995). Values, beliefs, and proenvironmental action: attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology*, 1611–1636.

Peattie, K. (1992). *Green Marketing.* London: Pitman.

Pereira, L., Carvalho, R., Dias, Á., Costa, R., & António, N. (2021). How Does Sustainability Affect Consumer Choices in the Fashion Industry? *Resources*, 10-38.

(2002). *Plan of Implementation of the World Summit on Sustainable Development.* Johannesburg: The United Nations.

Ren, Y. (2014). Status Quo Bias and Choice Overload: An Experimental Approach. *Working Paper*.

Schneider, C., Weinmann, M., & Brocke, J. V. (2018). Digital Nudging: Guiding Online User Choices through Interface Design. *Communication of the ACM*, 67-73.

Sethuraman, R., Gázquez-Abad, J. C., & Martínez-López, F. J. (2022). The effect of retail assortment size on perceptions, choice, and sales: Review and research directions. *Journal of Retailing*, 24-45.

Shen, D., & Dickson, M. (2001). Consumers' Acceptance of Unethical Clothing Consumption Activities: Influence of Cultural Identification, Ethnicity, and Machiavellianism. *Clothing and Textiles Research Journal.*, 76-87.

Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, pp. 99–118.

Spassova, G., & Isen, A. M. (2013). Positive affect moderates the impact of assortment size on choice satisfaction. *Journal of Retailing*, pp. 397–408.

Stern, P. C. (2002). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*.

Sunstein, C. (2013). Behavioral Economics and Paternalism. *Yale Law Journal*, 1867–1899.

Sylvi Ofstad, L. W. (1994). *Symposium: Sustainable Consumption.* Oslo: Norwegian Ministry for the Environment.

Thaler, R., & Sunstein, C. (2008). *Nudge: Improving Decisions About Health, Wealth, and Happiness.* Penguin Books.

(2021). *The Sustainable Development Goals Report.* The United Nations.

Toshkov, D. (2016). *Research Design in Political Science.* Political Analysis.

Vladimirova, K., & Le Blanc, D. (2016). Exploring Links Between Education and Sustainable Development Goals Through the Lens of UN Flagship Reports. *Sustainable Development*, 254-271.

Wee, S.-C., Choong, W.-W., & Low, S.-T. (2021). Can "Nudging" Play a Role to Promote Pro-Environmental Behaviour? *Environmental Challenges*.

Weinmann, M., Schneider, C., & Brocke, J. (2016). Digital Nudging. *Business & Information Systems Engineering*, 433-436.

White, K., Habib, R., & Hardisty, D. (2019). How to SHIFT Consumer Behaviors to be More Sustainable: A Literature Review and Guiding Framework. *Journal of Marketing, American Marketing Association*.

Wojnarowska, M., Sołtysik, M., & Prusak, A. (2021). Impact of eco-labelling on the implementation of sustainable production and consumption. *Environmental Impact Assessment Review*.

Appendix

Appendix A. Experiment survey design

Link to the survey: https://erasmusuniversity.eu.qualtrics.com/jfe/form/SV_byFjyEVnIQWkE6i

WHAT'S THE ENVIRONMENTAL FOOTPRINT OF PRODUCTION
REGULAR COTTON VS ORGANIC COTTON?

Organic cotton releases up to **46% less CO2** comparing to regular cotton.

Organic cotton uses **91% less water** than regular cotton.

Organic cotton has been found to use **62% less energy.**

No chemicals, fertilizers or pesticides to produce organic cotton.

Which product do you prefer?

REGULAR COTTON
UNISEX T-SHIRT
19€

Choice 1

ORGANIC COTTON
UNISEX T-SHIRT
29€

Choice 2

WHAT'S THE ENVIRONMENTAL FOOTPRINT OF PRODUCTION
REGULAR COTTON VS ORGANIC COTTON?

Organic cotton releases up to **46% less CO2** comparing to regular cotton.

Organic cotton uses **91% less water** than regular cotton.

Organic cotton has been found to use **62% less energy.**

No chemicals, fertilizers or pesticides to produce organic cotton.

Which product do you prefer?

REGULAR COTTON
UNISEX T-SHIRT
19€

Choice 1

REGULAR COTTON
UNISEX T-SHIRT
15€

Choice 3

ORGANIC COTTON
UNISEX T-SHIRT
29€

Choice 2

ORGANIC COTTON
UNISEX T-SHIRT
25€

Choice 4

→

WE BELIEVE IN CHANGE.
GEN Z
APPROVED

Have you seen this image in the survey?

Yes	○
No	○

I identify myself as a part of Generation Z

Strongly disagree	○
Disagree	○
Somewhat disagree	○
Neither agree or disagree	○
Somewhat agree	○
Agree	○
Strongly agree	○

Have you seen this image in the survey?

Yes	○
No	○

What emotion relates best to what you feel when looking at this image?

Hapiness	○
Sadness	○
Surprise	○
Fear	○
Anger	○
Disgust	○

Please express your opinion about the number of products presented before.

I had too little choices   ○ ○ ○ ○ ○   I had too many choices

How difficult was it for you to decide which product you prefer?

Not difficult at all   ○ ○ ○ ○ ○   Very difficult

How easy was it for you to decide which product you prefer?

Not easy at all   ○ ○ ○ ○ ○   Very easy

How attractive did you find the alternatives of displayed products?

Not attractive at all   ○ ○ ○ ○ ○   Very attractive

→

Please answers the following four questions

	1 - Strongly disagree	2	3	4 - Neither agree nor disagree	5	6	7 - Strongly agree
I feel overwhelmed by the amount of information.	○	○	○	○	○	○	○
I have a hard time keeping up with the given information.	○	○	○	○	○	○	○
Attention check - please mark strongly agree	○	○	○	○	○	○	○
I get frustrated by the amount of available information.	○	○	○	○	○	○	○

→

Please fill in the following two questions

	1 - Not satisfied at all	2	3	4	5 - Neither satisfied nor dissatisfied	6	7	8	9 - Very satisfied
How satisfied are you with your choice?	○	○	○	○	○	○	○	○	○
How satisfied would you be if you actualy received this product?	○	○	○	○	○	○	○	○	○

→

How old are you?

Under 18	○
18 - 24	○
25 - 34	○
35 - 44	○
45 - 54	○
55 - 64	○
65+ years old	○

How do you desribe yourself?

Male	○
Female	○
Non-binary / third gender	○
Prefer not to say	○

What is your complete level of education?

High school diploma	○
Bachelor	○
Master	○
PhD	○
Other	○

→

Appendix B. Descriptive statistics and randomization

Condition frequency and valid data

Statistics

condition

N	Valid	224
	Missing	0

condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1,00	37	16,5	16,5	16,5
	2,00	37	16,5	16,5	33,0
	3,00	41	18,3	18,3	51,3
	4,00	43	19,2	19,2	70,5
	5,00	38	17,0	17,0	87,5
	6,00	28	12,5	12,5	100,0
	Total	224	100,0	100,0	

Gender

How do you desribe yourself?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	94	42,0	42,0	42,0
	Female	120	53,6	53,6	95,5
	Non–binary / third gender	4	1,8	1,8	97,3
	Prefer not to say	6	2,7	2,7	100,0
	Total	224	100,0	100,0	

Age

How old are you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 18	50	22,3	22,3	22,3
	18 – 24	133	59,4	59,4	81,7
	25 – 34	27	12,1	12,1	93,8
	35 – 44	10	4,5	4,5	98,2
	45 – 54	3	1,3	1,3	99,6
	55 – 64	1	,4	,4	100,0
	Total	224	100,0	100,0	

Education level

What is your complete level of education?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school diploma	96	42,9	42,9	42,9
	Bachelor	57	25,4	25,4	68,3
	Master	34	15,2	15,2	83,5
	PhD	2	,9	,9	84,4
	Other	35	15,6	15,6	100,0
	Total	224	100,0	100,0	

Randomization – gender per condition

condition * How do you desribe yourself? Crosstabulation

Count

		How do you desribe yourself?				
		Male	Female	Non-binary / third gender	Prefer not to say	Total
condition	1,00	13	23	0	1	37
	2,00	15	19	1	2	37
	3,00	16	25	0	0	41
	4,00	19	22	1	1	43
	5,00	19	16	1	2	38
	6,00	12	15	1	0	28
Total		94	120	4	6	224

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9,229[a]	15	,865
Likelihood Ratio	11,885	15	,688
Linear-by-Linear Association	,665	1	,415
N of Valid Cases	224		

a. 12 cells (50,0%) have expected count less than 5. The minimum expected count is ,50.

Randomization – age per condition

condition * How old are you? Crosstabulation

Count

		How old are you?						Total
		Under 18	18 – 24	25 – 34	35 – 44	45 – 54	55 – 64	
condition	1,00	8	22	6	1	0	0	37
	2,00	7	19	6	2	2	1	37
	3,00	11	24	2	3	1	0	41
	4,00	9	29	2	3	0	0	43
	5,00	8	22	7	1	0	0	38
	6,00	7	17	4	0	0	0	28
Total		50	133	27	10	3	1	224

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	22,961[a]	25	,580
Likelihood Ratio	23,332	25	,558
Linear-by-Linear Association	1,483	1	,223
N of Valid Cases	224		

a. 23 cells (63,9%) have expected count less than 5. The minimum expected count is ,13.

Randomization – education per condition

condition * What is your complete level of education? Crosstabulation

Count

		What is your complete level of education?					Total
		High school diploma	Bachelor	Master	PhD	Other	
condition	1,00	18	5	8	1	5	37
	2,00	12	12	5	0	8	37
	3,00	19	7	7	1	7	41
	4,00	15	17	4	0	7	43
	5,00	17	12	6	0	3	38
	6,00	15	4	4	0	5	28
Total		96	57	34	2	35	224

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	20,463[a]	20	,429
Likelihood Ratio	21,515	20	,367
Linear-by-Linear Association	,884	1	,347
N of Valid Cases	224		

a. 8 cells (26,7%) have expected count less than 5. The minimum expected count is ,25.

Appendix C. Reliability statistics and correlations

Choice overload Cronbach's Alpha

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,936	,936	3

Choice satisfaction Cronbach's Alpha

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,880	,881	2

Correlations in the main model

Correlations

			sustinable_preference	IV_socialnudging	IV_informalnudging	asize
Spearman's rho	sustinable_preference	Correlation Coefficient	1,000	,357**	,475**	-,031
		Sig. (2-tailed)	.	,000	,000	,645
		N	224	158	140	224
	IV_socialnudging	Correlation Coefficient	,357**	1,000	.	,012
		Sig. (2-tailed)	,000	.	.	,882
		N	158	158	74	158
	IV_informalnudging	Correlation Coefficient	,475**	.	1,000	-,076
		Sig. (2-tailed)	,000	.	.	,373
		N	140	74	140	140
	asize	Correlation Coefficient	-,031	,012	-,076	1,000
		Sig. (2-tailed)	,645	,882	,373	.
		N	224	158	140	224

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix D. Variables testing

Independent variables

I identify myself as a part of Generation Z * DV_sn Crosstabulation

Count

		DV_sn		Total
		regular	organic	
I identify myself as a part of Generation Z	Strongly disagree	0	1	1
	Disagree	0	1	1
	Somewhat disagree	0	1	1
	Neither agree or disagree	3	3	6
	Somewhat agree	5	3	8
	Agree	6	17	23
	Strongly agree	1	2	3
Total		15	28	43

Choice satisfaction

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,281[a]	,079	,071	,48279

a. Predictors: (Constant), Please fill in the following two questions – How satisfied would you be if you actualy received this product?, Please fill in the following two questions – How satisfied are you with your choice?

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4,416	2	2,208	9,472	,000[b]
	Residual	51,513	221	,233		
	Total	55,929	223			

a. Dependent Variable: asize

b. Predictors: (Constant), Please fill in the following two questions – How satisfied would you be if you actualy received this product?, Please fill in the following two questions – How satisfied are you with your choice?

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,872	,095		19,657	,000
	Please fill in the following two questions – How satisfied are you with your choice?	-,035	,025	-,147	-1,404	,162
	Please fill in the following two questions – How satisfied would you be if you actually received this product?	-,033	,023	-,150	-1,432	,153

a. Dependent Variable: asize

Choice attractiveness

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,254[a]	,065	,060	,48547

a. Predictors: (Constant), Attracitve

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3,608	1	3,608	15,309	,000[b]
	Residual	52,320	222	,236		
	Total	55,929	223			

a. Dependent Variable: asize

b. Predictors: (Constant), Attracitve

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1,787	,084		21,195	,000
	Attracitve	-,105	,027	-,254	-3,913	,000

a. Dependent Variable: asize

Attracitve * asize Crosstabulation

Count

		asize smalla	large	Total
Attracitve	Not attractive	11	31	42
	2	20	14	34
	3	34	34	68
	4	37	27	64
	Very attractive	14	2	16
Total		116	108	224

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	20,886[a]	4	,000
Likelihood Ratio	22,393	4	,000
Linear-by-Linear Association	14,386	1	,000
N of Valid Cases	224		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 7,71.

Choice overload

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20,622	3	6,874	42,832	,000[b]
	Residual	35,307	220	,160		
	Total	55,929	223			

a. Dependent Variable: asize

b. Predictors: (Constant), Please answers the following four questions – I get frustrated by the amount of available information., Please answers the following four questions – I feel overwhelmed by the amount of information., Please answers the following four questions – I have a hard time keeping up with the given information.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	,863	,063		13,795	,000
	Please answers the following four questions – I feel overwhelmed by the amount of information.	,057	,027	,227	2,123	,035
	Please answers the following four questions – I have a hard time keeping up with the given information.	,102	,030	,393	3,415	,001
	Please answers the following four questions – I get frustrated by the amount of available information.	,003	,026	,011	,104	,917

a. Dependent Variable: asize

Appendix E – Hypothesis testing

Binary logistic regression – model 1

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	20,599	1	,000
	Block	20,599	1	,000
	Model	20,599	1	,000

Model Summary

Step	–2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	198,334[a]	,122	,163

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than ,001.

Classification Table[a]

	Observed		Predicted		
			DV_socialnudging		Percentage Correct
			regular	organic	
Step 1	DV_socialnudging	regular	52	29	64,2
		organic	22	55	71,4
	Overall Percentage				67,7

a. The cut value is ,500

Contingency Table for Hosmer and Lemeshow Test

		DV_socialnudging = regular		DV_socialnudging = organic		Total
		Observed	Expected	Observed	Expected	
Step 1	1	52	52,000	22	22,000	74
	2	29	29,000	55	55,000	84

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	IV_socialnudging	1,500	,343	19,180	1	,000	4,483	2,291	8,773
	Constant	-,860	,254	11,439	1	,001	,423		

a. Variable(s) entered on step 1: IV_socialnudging.

Binary logistic regression – model 2

Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	33,011	1	,000
	Block	33,011	1	,000
	Model	33,011	1	,000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	160,813[a]	,210	,280

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than ,001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	,000	0	.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	,000	0	.

Contingency Table for Hosmer and Lemeshow Test

		DV_informalnudging = ,00		DV_informalnudging = 1,00		
		Observed	Expected	Observed	Expected	Total
Step 1	1	52	52,000	22	22,000	74
	2	15	15,000	51	51,000	66

Classification Table[a]

			Predicted		
			DV_informalnudging		Percentage Correct
Observed			,00	1,00	
Step 1	DV_informalnudging	,00	52	15	77,6
		1,00	22	51	69,9
	Overall Percentage				73,6

a. The cut value is ,500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	IV_informalnudging	2,084	,389	28,769	1	,000	8,036	3,753	17,210
	Constant	-,860	,254	11,439	1	,001	,423		

a. Variable(s) entered on step 1: IV_informalnudging.

Binary logistic regression – model 3

Matrix

```
Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.1 *****************

        Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2022). www.guilford.com/p/hayes3

*************************************************************************
Model : 1
    Y : DV_sn
    X : IV
    W : asize

Sample
Size:  158

*************************************************************************
OUTCOME VARIABLE:
 DV_sn

Coding of binary Y for logistic regression analysis:
    DV_sn  Analysis
     ,00      ,00
    1,00     1,00

Model Summary
      -2LL    ModelLL       df         p  McFadden  CoxSnell  Nagelkrk
  198,0698    20,8635   3,0000    ,0001     ,0953     ,1237     ,1650

Model
            coeff        se        Z         p      LLCI      ULCI
constant   -,7340     ,3512  -2,0900    ,0366   -1,4223    -,0457
IV          1,3907     ,4815   2,8886    ,0039     ,4471    2,3344
asize       -,2593     ,5103   -,5081    ,6114   -1,2594     ,7408
Int_1        ,2267     ,6865    ,3302    ,7413   -1,1188    1,5721

These results are expressed in a log-odds metric.
```

Binary logistic regression – model 4

```
Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.1 *****************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
     Documentation available in Hayes (2022). www.guilford.com/p/hayes3

**************************************************************************
Model  : 1
    Y  : DV_in
    X  : IV_in
    W  : asize

Sample
Size:  140

**************************************************************************
OUTCOME VARIABLE:
 DV_in

Coding of binary Y for logistic regression analysis:
    DV_in  Analysis
      ,00       ,00
     1,00      1,00

Model Summary
        -2LL    ModelLL         df          p   McFadden   CoxSnell   Nagelkrk
    160,5072    33,3168     3,0000      ,0000      ,1719      ,2118      ,2825

Model
              coeff         se          Z          p       LLCI       ULCI
constant     -,4747      ,7940     -,5979      ,5499    -2,0308     1,0814
IV_in        1,5155     1,1937     1,2696      ,2042     -,8240     3,8551
asize        -,2593      ,5103     -,5081      ,6114    -1,2594      ,7408
Int_1         ,3885      ,7862      ,4942      ,6212    -1,1524     1,9294

These results are expressed in a log-odds metric.

Product terms key:
 Int_1    :        IV_in    x         asize

Covariance matrix of regression parameter estimates:
           constant      IV_in      asize      Int_1
constant      ,6304     -,6304     -,3837      ,3837
IV_in        -,6304     1,4249      ,3837     -,8870
asize        -,3837      ,3837      ,2604     -,2604
Int_1         ,3837     -,8870     -,2604      ,6181
```