10.2478/nispa-2025-0014

Acceptance of Food Nudges among Type 2 Diabetics in Czechia (case of a CEE country)

Radek Kovács[1], František Ochrana[2]

Abstract:

Type 2 diabetes (DM2), a major lifestyle disease, extends beyond medical issues, with social sciences offering solutions such as changing eating habits through nudging interventions. This study examines the acceptability of 33 food-nudging interventions among Czech diabetics (N = 456) via an electronic questionnaire, assessing responses on a scale from 1 (acceptable) to 4 (unacceptable). With 87.8% of nudges scoring within the acceptable range, the highest support was for shopping trolleys promoting fruits and vegetables (1.27), while reduced portions in public canteens had the lowest (3.31). Findings suggest that non-digital nudges are widely accepted and can inform effective DM2 preventive strategies and health policy recommendations.

Keywords:
acceptance nudging, acceptance of various forms of nudging, Czech Republic, food nudging, type 2 diabetes mellitus

1 Prague University of Economics and Business, Prague, Czechia.
2 Charles University, Prague, Czechia.

1. Introduction

One of the serious diseases of civilization is Type 2 diabetes (DM 2). This disease is primarily the subject of medical analysis (e.g., Ferrannini et al., 2014; Yi et al., 2016). DM 2 disease causes high societal costs and represents a significant national burden (see Lin et. al., 2020). According to a survey by the American Diabetes Association (ADA) on March 22, 2018, the total costs of diagnosed diabetes have risen to $327 billion in 2017 from $245 billion in 2012 (see: https://diabetes.org/about-us/statistics/cost-diabetes). It is, therefore, an urgent social task to reduce the risks of DM 2 disease and guide patients diagnosed with DM 2 towards recovery.

Scientific studies report that DM 2 disease is caused by several risk factors (e.g., Bhaskara et al, 2022). In addition to genetic factors, these include, for example, obesity (Han and Boyko, 2018), unhealthy eating (Nijhawan et al., 2014; Furukawa et al., 2022), and inappropriate eating behavior (Mesas et al., 2011). These are factors that are related to human behavior. The influence of these factors can be reduced or eliminated by changing the behavior of patients. The problem of DM 2 is therefore not only a medical issue.

It is a multidisciplinary problem. Therefore, besides medical sciences, its solution requires the involvement of other scientific disciplines, such as psychology, behavioral economics, administrative science, sociology, and public policy. In this study, we focus on exploring the role of nudging theory as a supportive tool influencing the role of nudging among type 2 diabetics in Czechia. We look for and test factors that influence the acceptance of food nudges among type 2 diabetics. The main source for identifying these factors was the literature content analysis.

When analyzing a scientific database, we found that nudging is generally accepted as an appropriate (non-violent) concept and tool to change inappropriate or harmful behavior (Oliver, 2013).

Out of the 645 research studies published on Wos and Scopus (2017-2021), over 80% of the studies believe that nudging has a significant positive behavioral effect. Minority opinions (e.g., Hausman & Welch, 2010) reject nudging as hidden manipulation and hidden coercion.

The discussion of authors who promote the use of nudging became decisive for the theoretical-conceptual framework. In the discussion, we examined compelling arguments presented by Djupegot et al. (2019) that were shown to influence behavior significantly. Their overview is shown in Table 1.

Table 1:

Conceptual Model of Factors Influencing the Behavior of the Target Group Classified by Authors

Factors influencing the behavior of the target group	Authors
Setting a calorie goal before shopping	Mohr et al. (2019)
Providing instruction at the time of food consumption	Muñoz-Vilches et al. (2018)
Exposure to informal placemats in a restaurant	Anzman-Frasca et al. (2018)
Improving the attractiveness of images accompanying healthy recipes	Starke. et al. (2021)
Using contrasting colors	Wan et al. (2021)
Package coloring	Tijssen et al. (2017); Reinoso-Carvalho et al. (2021)
Calorie-labeling messages	Policastro et al. (2017)
Using text messages	Grutzmacher et al. (2018)
Making claims of benefits to psychological health	Sogari et al. (2019)
Environmentally friendly choices (consumers are willing to pay more for such goods)	Grebitus et al. (2020)
Food labeling contributes to healthy eating habits.	Montagni et al. (2020); Benson et al. (2018); Cerezo-Prieto and Frutos-Esteban, (2021)
Auditory impressions	Peng-Li et al. (2020)
Visual impressions from prompts at the point of purchase	Allan and Powell (2020)
Food imagery directed at the senses	Lange et al. (2020)
Improved food presentation, availability of target foods, and modifying the environment where food is consumed	Walker et al. (2019); McAlister et al. (2020); Erjavec et al. (2020); Carroll et al. (2018)
The timing of the presentation of a food	Tonkin et al. (2019)
Creating a vegetarian "dish of the day"	Saulais et al. (2019)
The influence of positioning	Keegan et al. (2019); Van Gestel et al. (2017); Mikkelsen et al. (2021); Vandenbroele et al. (2019)
Proximity	Ghoniem et al. (2020); Knowles et al. (2019); Van Kleef et al. (2020); Immink et al. (2021)
Size nudges	Robinson and Kersbergen, (2018); Garnett et al. (2019); Coucke et al. (2019); Petit et al. (2018); Venema et al. (2020)
Decoy effect	Van den Enden and Geyskens, (2021)
Defaults	Van Kleef et al. (2018); Bergeron et al. (2019); Marques et al. (2020); Dalrymple.et al. (2020); Holligan et al. (2019); Coffino et al. (2020); Hansen et al. (2021)
Framing	Benito-Ostolaza et al. (2021); Krpan and Houtsma, (2020); Britwum and Yiannaka, (2019)
Monetary nudges	Nagatomo et al. (2019); Zeballos et al. (2020)
Salience effect	Fennis et al. (2020); Ozturk et al. (2020); Thunström et al. (2018)
Social norms	Gonçalves et al. (2021); Huitink et al. (2020); Hogreve et al. (2020); Morren et al. (2021); Hawkins et al. (2021); Ewert (2017)
Multi-component nudges	Combining changes towards choice architecture, pledges to maintain healthy lifestyles, and material incentives (Samek, 2019); combining priming and social norms (Vermote et al., 2020); Combining physical cues and social norms (Raghoebar et al., 2019); employment of positioning and labeling nudges (Marcano-Olivier et al., 2019); using decorations, creative names for dishes, and taste tests (Hamdi et al., 2020); product placement and sensory and cognitive nudges (Mistura, 2019)

Source: Authors' own according to WOS and Scopus, 2025

At the same time, when analyzing the scientific literature, we discovered that several factors have an ambivalent (or small) impact on the behavior. For instance, Zhou et al. (2019) found that the "dish of the day" nudge did not influence older people's choices. A similar effect of Zhou et al. (2019) was observed in Boehm et al. (2020). They find no evidence that promoting healthy school meals decreases the sales of less nutritious food options.

Another ambivalent factor is adding information to packaging. Adding health or taste messaging to packaging did not affect the consumption of healthier white milk relative to sugar-sweetened chocolate milk (Lai et al., 2019).

Blom et al. (2021) found that time pressure influenced the sales of healthy nudged products. Mazza et al. (2017) reported positive and negative outcomes of traffic-light labeling interventions. Castellari et al. (2019) argued that menu labeling had only a small or no effect.

Similarly, Wyse et al. (2019) found that positioning target products first or last on the online menu of a canteen did not increase customers' choice of those items. Kosīte et al. (2019) found no evidence that the size of tableware influences the amount of food consumed. A study by Attwood et al. (2020) did not show any effect of providing an asymmetric choice of options. That is, there was no decoy effect (e.g., a 30% increase in the price did not significantly change the number of people choosing an inferior "decoy" dish).

On the other hand, Cheung et al. (2019) recorded mixed outcomes from combined nudges, and Ohlhausen and Langen (2020) did not recommend labels or presenting a less attractive decoy dish next to a more appealing target dish to foster sustainable food choices.

2. Theoretical-conceptual framework and methodology

Public policy actors can use different types of instruments to implement objectives. With some simplification, we can classify these tools into two groups. The first group includes coercive instruments (such as prohibitions, orders, and legal regulations). The second group includes "soft" tools (such as nudging).

Coercion can be useful and effective in some areas of social life, such as in the case of justice (Brauer et al., 2017), and healthcare (Hupé et al., 2024; Sutton et al., 2013; Van Dijk & Bernstein, 2025), child antisocial behavior (Eddy et al, 2001), police culture (Terrill et al., 2003). On the other hand, coercive instruments provoke resistance because they restrict individual freedom (Brehm, 1966). Non-coercive tools do not have such a negative impact (Cooper et al., 2007). Therefore, it is more appropriate to look for tools that support proactivity (Parker et al., 2010; Parker et al., 2018; Rogozińska-Pawełczyk & Wiktorowicz, 2024; Guzman et al., 2024). According to Parker et al. (2018),

proactivity refers to the self-initiated and future-oriented actions undertaken by individuals to effect change in themselves or their circumstances. Proactivity can positively benefit individuals and organizations alike. Linking proactivity with motivation can increase the effects of desired behaviors (Van Bavel et al., 2018).

Employing nudge tools can also increase the proactive effect (Gajewski et al., 2022). This effect is illustrated by Aman et al. (2025) in the case of digital nudges. They conclude that effective digital nudges for consumers can encourage proactive, healthier dietary decisions. The core theory (Lakatos, 1978) and at the same time the explanatory paradigm (Kuhn, 2012) is the nudge theory (Thaler & Sunstein, 2008; Oliver, 2013; Michie & West, 2012; Kosters & Van der Heijden, 2015; Öztürk & Arun, 2024).

Theory of nudge plays a central role in elucidating the acceptance of food-related nudges among individuals with type 2 diabetes in Czechia. We assume that people generally perceive nudging more positively than outright prohibitions and commands, because nudging leaves a choice. Freedom of choice (Friedman & Friedman, 1990) strengthens the initiative and motivation of the personality to change (Maslow, 1998). At the same time, patient decisions depend on many individual factors and various provider characteristics (Victoor et al., 2012). We realize that our study focuses only on some interventions. Overall, it examines the impact of 3 interventions on modifying eating behaviors. These interventions were chosen based on a systematic analysis of the literature and the relevance of the scientific discourse, the established research subject, and the defined research questions. Based on a questionnaire, we investigate how patients with DM2 accept different forms of nudge-based interventions.

The research questions (RQ) are as follows:

RQ1: What is the attitude of type 2 diabetics towards food nudging? Do they consider them as appropriate tools that can help?

RQ2: Do type 2 diabetics differ in their attitudes towards food nudging depending on their gender?

RQ3: Are there differences in acceptance of food nudging depending on age?

RQ4: Are there differences in acceptance of food nudging depending on the socioeconomic status of type 2 diabetics?

Appropriate methods and data were used to find answers to the research questions.

3. Data and data collection procedure

This study is based on the author's dissertation (X, 2024), which has been slightly modified for this article.

To effectively address the research questions, relevant data were collected through

a systematic research process consisting of the following steps:

In the first step, we approached all diabetes associations in the Czech Republic (a total of 12 diabetes associations) with a request to conduct research with their patients. After obtaining consent, we implemented the second step.

An electronic questionnaire was developed, tested, and refined to ensure clarity and effectiveness. Then, in the third step, we collected the data. We contacted the respondents. Respondents were addressed using an electronic questionnaire created at Click4survey via social media (Facebook). The data was collected from 29th September to 17th November 2022. We received a total of 505 responses. We excluded non-DM2 and finally used a sample of 456 respondents. The questionnaire is available upon request.

The questionnaire is structured in two parts. Part 1 consists of the sociodemographic characteristics of the respondents. Table 2 shows the results of this part of the research.

Table 2:

Structure of Respondents according to Selected Socio-Demographic Characteristics

Socio-demographic characteristics		N	Share in %
Sex	Male	303	66.4
	Female	153	33.6
Age	26-40	41	9.0
	41-60	370	81.1
	61 and more	45	9.9
Highest Education	High school without a school-leaving examination	10	2.2
	High school with a school-leaving examination	92	20.2
	college or university	354	77.6
Economic Activity	Employee	434	95.2
	Self-employed	22	4.8
Total			100

Source: Authors' own, 2024

The characteristics of the respondents are compared according to selected socio-

demographic characteristics. The structure of respondents according to selected socio-demographic characteristics is the result of a convenience sampling approach. Unsurprisingly, respondents below 26 years are absent from the research sample, particularly because Type 2 diabetes is significantly less common in this age group.

The core section of the questionnaire was developed based on insights from the literature review, with questions designed to assess the level of acceptance of proposed nudging-based interventions. The suggested nudges are categorized in Table 3.

4. Methods

We used simple descriptive statistics to evaluate the questionnaire data. To receive clear answers, we enabled the respondents to select from only four possible answers (acceptable, somewhat acceptable, somewhat unacceptable, and unacceptable). The answers in the questionnaire were coded with values as follows: acceptable with a value of 1, somewhat acceptable with a value of 2, somewhat unacceptable with a value of 3, and unacceptable with a value of 4. The borderline value of acceptance is thus 2.5. The results are shown in Tables 2 and 3 in the Results section.

5. Results

First, we clearly state that the results are reported only for the surveyed respondents since the sample does not support generalization (e.g., gender ratio: 66% men and 34% women). Proposed nudges are categorized as digital and non-digital. Digital nudges are interventions that utilize technology to influence behavior, such as apps, notifications, or online prompts. They offer the advantage of being easily scalable and personalized, but may lack direct human interaction. Non-digital nudges, on the other hand, involve physical or environmental cues. These are more tangible and visually impactful but may lack the adaptability of digital methods (Mullett, 2022).

Table 3 provides information on the acceptance of proposed food nudges. The degree of acceptance is expressed by a number (in the interval from 1 to 4) and is also distinguished by color. The green color symbolizes the highest degree of acceptance. The color red symbolizes unacceptability. As is clear from the data in Table 3, shopping trolleys with an inlay promoting the purchase of fruit and vegetables in supermarkets have the highest acceptance rate (1.27). Reducing the portion sizes of meals in schools and public canteens enjoyed the lowest support (3.31).

Table 3:

Acceptance of Proposed Food Nudges

Shopping trolleys with an inlay promoting the purchase of fruit and vegetables in supermarkets	non-digital nudge	1.27
Healthy foods are placed near the checkout	non-digital nudge	1.34
Better availability of healthy food in supermarkets	non-digital nudge	1.34
Placing healthier products at eye level in the supermarket	non-digital nudge	1.36
Cash discounts when buying healthy products	non-digital nudge	1.37
Improved presentation of healthy food in restaurants and canteens	non-digital nudge	1.38
Placing healthier drinks at eye level in the supermarket	non-digital nudge	1.39
Canteen and restaurant decorations promoting healthy eating	non-digital nudge	1.4
Visible calorie labels on food packaging	non-digital nudge	1.42
Increasing the availability of healthier products in school and factory canteens	non-digital nudge	1.47
Educational campaigns to combat obesity and overeating	non-digital nudge	1.49
Automatic addition of vegetable side dishes to the existing menu	non-digital nudge	1.49
Advertising promoting local food	non-digital nudge	1.58
Negatively communicated information about healthy eating through text messages and email communication	digital nudges	1.59
Relocating healthier foods in supermarkets closer to shoppers and unhealthy items further away	non-digital nudge	1.66
Creating a sense of abundance for healthy products (e.g., 'pay CZK 150 and get all healthy food and drinks for free')	non-digital nudge	1.7
Advertising to discourage overeating	non-digital nudge	1.72
Offering a healthy substitute alongside the meat product in schools and public canteens	non-digital nudge	1.73
Supermarket checkout areas are exclusively without sweets	non-digital nudge	1.81
Placing healthier options at the beginning of the menu	non-digital nudge	1.81
Vegetarian food in restaurants presented as "meal of the day"	non-digital nudge	1.85
Nutritional traffic lights on menus for individual dishes	non-digital nudge	1.85
Use of telemedicine to combat obesity (e.g., regular weekly medical consultations with an obesitologist/diabetologist via phone calls, text messages, email communication)	digital nudge	1.93
Creative names for healthy food (e.g., veggie burger, meatless tartare)	non-digital nudge	1.95
Presenting less attractive food alongside more attractive, healthy food	non-digital nudge	1.98
Positively communicated information on healthy eating through text messages and email communication	digital nudge	2.05
Meat-free days in school and public canteens	non-digital nudge	2.15
Offering a meat substitute alongside a similar meat product in supermarkets	non-digital nudge	2.22
Inducing shortages of healthy products (e.g., 'limited availability' or 'while stocks last')	non-digital nudge	2.33
Pledging doctors to reduce calorie intake	non-digital nudge	2.54
Setting a calorie goal before online grocery shopping	digital nudge	2.78
Text messages reminding people to eat healthily	digital nudge	2.91
Reduced portion sizes of meals in school and public canteens as a default	non-digital nudge	3.31
Mean		1.82

Source: Authors' own, 2024

Table 4 shows respondents' preferences or perceived effectiveness of various nudging strategies for promoting healthy eating, categorized by age group, education level, and employment status. The values in the table represent mean ratings, with higher numbers indicating greater support.

Table 4:

Respondents' preferences of various nudging strategies for promoting healthy eating

	26-40	41-60	61 and more	High school without a school-leaving examination	High school with a school-leaving examination	College or university	Employee	Self-employed
Shopping trolleys with an inlay promoting the purchase of fruit and vegetables in supermarkets	1.51	1.21	1.62	1.10	1.17	1.31	1.29	1.00
Healthy foods placed near the checkout	1.02	1.33	1.69	1.10	1.04	1.42	1.34	1.36
Better availability of healthy food in supermarkets	1.54	1.30	1.49	1.10	1.22	1.38	1.36	1.00
Visible calorie labels on food packaging	1.00	1.41	1.87	1.20	1.16	1.49	1.44	1.00
Improved presentation of healthy food in restaurants and canteens	1.54	1.33	1.67	1.10	1.27	1.42	1.40	1.00
Canteen and restaurant decorations promoting healthy eating	1.54	1.35	1.69	1.10	1.22	1.46	1.42	1.00
Placing healthier products at eye level in the supermarket	1.37	1.32	1.67	1.10	1.10	1.44	1.35	1.64
Increasing the availability of healthier products in school and factory canteens	1.02	1.49	1.71	2.00	1.04	1.57	1.50	1.00
Placing healthier drinks at eye level in the supermarket	1.88	1.30	1.67	1.10	1.22	1.44	1.38	1.64
Educational campaigns to combat obesity and overeating	1.02	1.48	2.00	2.10	1.04	1.59	1.51	1.00
Advertising promoting local food	1.05	1.61	1.82	2.00	1.09	1.70	1.61	1.00
Automatic addition of vegetable side dishes to the existing menu	1.56	1.46	1.60	2.00	2.13	1.31	1.51	1.00
Cash discounts when buying healthy products	2.02	1.27	1.62	1.10	1.13	1.44	1.28	3.27
Advertising to discourage overeating	1.05	1.74	2.22	2.10	1.61	1.74	1.76	1.00
Nutritional traffic lights on menus for individual dishes	1.41	1.89	1.91	1.10	1.67	1.92	1.86	1.64
Negatively communicated information about healthy eating through text messages and email communication	1.02	1.61	1.91	2.90	1.41	1.59	1.60	1.02

Relocating healthier foods in supermarkets closer to shoppers and unhealthy items further away	2.24	1.61	1.56	1.10	1.32	1.77	1.63	2.24
Use of telemedicine to combat obesity (e.g., regular weekly medical consultations with an obesitologist/diabetologist via phone calls, text messages, email communication)	1.54	1.96	2.04	1.10	1.53	2.06	1.94	1.54
Supermarket checkout areas exclusively without sweets	1.56	1.78	2.24	2.10	1.76	1.81	1.85	1.56
Placing healthier options at the beginning of the menu	1.39	1.81	2.20	2.10	1.52	1.88	1.82	1.39
Offering a healthy substitute alongside the meat product in school and public canteens	1.39	1.73	2.04	2.90	1.16	1.84	1.73	1.39
Creating a sense of abundance for healthy products (e.g., 'pay CZK 150 and get all healthy food and drinks for free')	1.54	1.68	1.96	2.90	1.70	1.66	1.70	1.54
Vegetarian food in restaurants presented as "meal of the day"	1.39	1.79	2.69	3.00	1.26	1.97	1.86	1.39
Presenting less attractive food alongside more attractive healthy food	1.88	1.94	2.42	2.10	1.64	2.06	1.96	1.88
Meat-free days in school and public canteens	1.10	2.19	2.78	3.00	2.18	2.12	2.21	1.10
Positively communicated information on healthy eating through text messages and email communication	2.07	2.02	2.29	2.10	1.32	2.24	1.97	3.64
Creative names for healthy food (e.g. vegeburger, meatless tartare)	1.88	1.90	2.47	3.90	1.65	1.97	1.95	2.00
Offering a meat substitute alongside a similar meat product in supermarkets	1.95	2.22	2.49	3.90	1.87	2.27	2.25	1.64
Making a pledge to doctors to reduce calorie intake	1.95	2.58	2.78	2.20	2.35	2.60	2.57	2.00
inducing shortages of healthy products (e.g., 'limited availability' or 'while stocks last')	2.24	2.29	2.76	3.00	1.82	2.45	2.30	3.00
Setting a calorie goal before online grocery shopping	3.17	2.69	3.20	2.20	2.62	2.84	2.76	3.27
Text messages reminding people to eat healthily	3.15	2.86	3.11	2.20	3.18	2.86	2.89	3.27
Reduced portion sizes of meals in school and public canteens as a default	3.37	3.27	3.58	4.00	3.52	3.23	3.34	2.64

Source: Authors' own, 2024

Key insights from the table include:

Older respondents (61 and more) tend to rate certain interventions, such as "vegetarian food in restaurants presented as the meal of the day" and "reduced portion sizes in school and public canteens," more highly than younger groups.

Education level appears to influence preferences, with respondents holding only a high school education (without a leaving exam) generally providing lower ratings than university graduates.

Self-employed individuals tend to show lower support for certain nudges (shopping trolleys with inlays promoting the purchase of fruit and vegetables) compared to employees.

Table 5 shows the acceptance of digital and non-digital nudges depending on the socio-demographic characteristics of the respondents.

Table 5:

Acceptance of digital and non-digital nudges

	all	significant difference between groups	digital	significant difference between groups	non-digital	significant difference between groups
Male	1.89	0.00	2.29	0.22	1.82	0.00
Female	1.70		2.18		1.61	
24-40	1.68	0.00	2.19	0.00	1.59	0.00
41-60	1.80		2.23		1.72	
61 and more	2.14		2.51		2.08	
High school without a school-leaving examination	2.06	0.00	2.10	0.00	2.05	0.00
High school with a school-leaving examination	1.60		2.01		1.53	
College or university	1.87		2.32		1.79	
Employee	1.83	0.26	2.23	0.00	1.76	0.00
Self-employed	1.74		2.65		1.57	
Total	1.82	-	2.25	-	1.75	-

Source: Authors' own, 2024

6. Discussion

The study provides a comprehensive analysis of the acceptance of various food nudges among Type 2 diabetics in Czechia, highlighting significant findings that can inform public health strategies. RQ1 examined the attitude of type 2 diabetics towards food

nudging. Several factors have a strong or significant influence on the change in attitude of the respondents. In total, 33 different nudges were examined (see Table 3). The results show that most of the proposed food nudges were acceptable. The borderline value of acceptance (2.5) was met by 87.8% of the items offered. Only four offer forms (pledging doctors to reduce calorie intake, setting a calorie goal before online grocery shopping, text messages reminding people to eat healthily, and reducing portion sizes of meals in school and public canteens) were below the limit of acceptability (mean exceeding the borderline value of 2.5). The respondents generally considered making healthy products and produce more visible and accessible as the most effective forms of nudging.

Restrictive nudges (reminding messages, setting calorie intake, or portion size) were the least acceptable forms of nudging. One of the most notable findings is the higher acceptance of non-digital nudges compared to digital ones, which might reflect broader societal attitudes towards technology and privacy in the Czech Republic. However, this claim cannot be considered generally valid due to the disproportionate representation of digital versus non-digital nudges. Nonetheless, the finding highlights the role of trust in the acceptance of health-related digital interventions.

The resistance to certain nudges, such as reducing portion sizes or setting calorie goals, underscores the complexity of dietary behavior change. It suggests that interventions perceived as restrictive or intrusive may face higher resistance, which can diminish their effectiveness. This finding aligns with the broader literature on behavioral economics, which emphasizes the importance of designing nudges that align with individuals' autonomy and perceived control over their choices.

The study's implications for public health policy are significant. A better understanding of the nuances surrounding the acceptance of nudges may assist policymakers in designing interventions that are more attuned to cultural and social contexts. While such insights do not guarantee effectiveness, they can inform the development of public health strategies that have a greater potential to be accepted by the target population, thereby possibly enhancing their impact.

RQ 2 examined the extent to which diabetics differ in their attitudes towards food nudging depending on their gender. The gender differences observed in nudge acceptance suggest that health interventions should be gender sensitive. Females, who found the nudges more acceptable, might be more receptive to health interventions, potentially due to higher health consciousness or differing health communication preferences. This insight could guide the development of more personalized health communication strategies that resonate with different demographic groups. Both in total and non-digital nudges, females deem the nudges more acceptable. They find digital nudges similarly acceptable. The analysis suggests that when developing a nudging strategy and selecting specific types of nudging interventions, health policy actors should consider potential gender differences in attitudes toward the proposed measures. This consideration may contribute to a more nuanced and potentially more effective application of nudges across the patient population.

RQ3 examined whether there are differences in the acceptance of food nudging depending on age. The finding is as follows: the elderly find the nudges the least acceptable, especially those of a digital nature. The finding that acceptance of food-related nudges varies by age indicates that targeting specific patient segments, rather than applying interventions uniformly across all individuals with diabetes, may lead to more effective outcomes.

RQ 4 examined whether there are differences in acceptance of food nudging depending on the socioeconomic status of type 2 diabetics. There are no significant differences between those who are employed and those who are self-employed. This finding is not surprising. Diabetes mellitus has a personal negative effect on the patients, regardless of whether they are employees or self-employed. However, we note differences in the acceptance of nudging depending on the level of education. Respondents, without at least a high school diploma, considered the nudges the least acceptable. Those with a high school diploma without a college or university degree deemed the nudges the best. This finding can be interpreted as a consequence of the different levels of knowledge about nudging in individual "educational groups".

Digital nudges are notably less acceptable than non-digital ones across all socio-demographic groups - a surprising finding that warrants further investigation. One possible explanation is a general lack of trust among Czech citizens, driven by fears that digital tools could be misused for surveillance and lead to political discrimination or criminalization

Based on the research, Table 6 shows major public policy recommendations to encourage healthier eating habits and improve the management of Type 2 Diabetes (DM2) through food nudging.

Table 6:

Major Public Policy Recommendations

Promoting Non-Digital Nudges	Use visually enhanced shopping trolleys and sensory cues to highlight fruits and vegetables.
Educational and Informational Interventions	Implement clear calorie labeling and health benefit messages to inform consumers.
Environmental Adjustments	Improve food positioning and set healthy defaults in schools and workplaces.
Encourage Sustainable and Ethical Choices:	Encourage environmentally friendly products and promote plant-based meals.
Community and Social Norms	Use social campaigns and peer groups to foster collective healthy behaviors.
Avoid Unacceptable Nudges	Steer clear of reminders and pledges; adjust portion sizes subtly without negative perceptions.
Socioeconomic Considerations	Tailor nudges to be inclusive and ensure affordability of healthy options.
Monitoring and Evaluation	Regularly evaluate interventions and work with diverse stakeholders to enhance policy impact.

Source: Authors' own, 2024

To effectively address gender differences, it is advisable to implement tailored approaches. For men, digital nudges—such as mobile apps and notifications—should be emphasized, as they tend to be more receptive to technology-driven interventions. In contrast, women may respond better to non-digital nudges, including visual cues and social support within community settings, due to the stronger responsiveness to interpersonal and environmental influences.

The age of the target group also plays a significant role in the acceptance of nudges. Younger adults (ages 26–40), generally more accustomed to digital interactions, may benefit from personalized app notifications and gamified health challenges. Conversely, older adults (aged 41 and above) tend to respond more positively to traditional, non-digital nudges, such as clear labeling and the strategic placement of healthier food options in physical settings.

Socio-economic factors also significantly influence the effectiveness of nudges. For higher-income groups, digital interventions that utilize wearable technologies and fitness tracking are recommended, as these individuals are more likely to have access to such tools. In contrast, for lower-income groups, cost-effective, non-digital nudges - such as community workshops and access to affordable healthy food options - should be prioritized to help reduce barriers to making healthier choices.

Adopting these recommendations can create a supportive environment that encourages healthier eating behaviors and better management of Type 2 Diabetes, reducing the societal and economic burden of the disease. Future research on food nudges could benefit from exploring several key areas. Investigating cultural variability in the acceptance of food nudges by conducting comparative studies across different countries or regions could reveal how cultural contexts influence nudge effectiveness, particularly in regions with varying dietary habits and health outcomes. Additionally, longitudinal studies would be valuable to assess whether the initial acceptance of food nudges translates into sustained behavioral change over time. Given the study's findings that digital nudges are generally less acceptable than non-digital ones, further research should focus on understanding the reasons behind this, particularly examining how different age groups' attitudes towards digital interventions and their digital literacy levels impact nudge acceptance. Moreover, exploring the psychological mechanisms behind nudge acceptance, including factors like risk perception, trust in health authorities, and cognitive biases, could enhance the design of more effective nudges. Research should also delve into the role of socioeconomic status in nudge effectiveness, examining how income, education, and access to healthy foods influence the acceptance of nudges, which could lead to more tailored and inclusive interventions. Finally, combining nudges with other interventions, such as financial incentives or educational campaigns, could be explored to determine if multi-component approaches yield synergistic effects on behavior change.

The analysis also shows general suggestions for public policy. For the effectiveness of public policy, public policy actors must choose appropriate tools to effectively meet

the objectives of public policies so that patients are willing to accept health policy tools and measures.

Given the significant social costs, it is in the interest of public policies to look for tools that will influence patients' negative eating habits. It is therefore a question of how to influence the behavior of patients in the "desired direction". To do this, public policy actors have two types of tools at their disposal, namely government suppression and behavioral interventions. Enforcement tools include, for example, regulations, prohibitions, fines, and required obligations. In our study, we worked with the assumption (motivation theory, Maslow, 1998) that coercive tools are perceived rather negatively because they restrict individual freedom and provoke resistance. People may feel manipulated or unjustly punished. If the rules are strict, some patients with diabetes can play "hide and seek." This can manifest itself, for example, in the fact that they will hide their eating habits. There may also be psychological reactance, which manifests itself as resistance to coercion. This can induce the opposite behavior. If patients feel restricted or compelled to perform a certain behavior, they may respond with resistance, even though it would be in their interest to change the behavior. In this case, patients may consciously reject the rules and recommendations of health policy and even act contrary to the intentions (goals) of public policy actors. This can manifest itself, for example, in the fact that they overestimate the "lost choice." If they perceive coercion by public policy as unfair, it can lead to a reduction in the authority of public policy actors. It is therefore more appropriate to choose nudging tools in the form of a gentle nudge, inducing positive motivation or non-violently making a change of environment.

The results of the study are well-supported by the existing literature on food nudges. Setting calorie goals before shopping supports Mohr et al. (2019), while the effectiveness of calorie-labeling messages corresponds with Policastro et al. (2017). Visual prompts at the point of purchase influence behavior, as shown by Allan and Powell (2020), and food imagery stimulates sensory perceptions, reinforcing Lange et al. (2020). Environmental influences, such as food presentation and availability, align with Walker et al. (2019), McAlister et al. (2020), Erjavec et al. (2020), and Carroll et al. (2018), while the creation of vegetarian options is consistent with Saulais et al. (2019). The role of social norms in food choices supports findings from Gonçalves et al. (2021), Huitink et al. (2020), and Hawkins et al. (2021), while framing effects match those in Benito-Ostolaza et al. (2021), Krpan and Houtsma (2020), and Britwum and Yiannaka (2019). Sensory influences, including improved food imagery and contrasting colors, align with Starke et al. (2021), Wan et al. (2021), Tijssen et al. (2017), and Reinoso-Carvalho et al. (2021), while auditory nudges correspond with Peng-Li et al. (2020). Findings on food proximity match those of Ghoniem et al. (2020), Knowles et al. (2019), and Van Kleef et al. (2020), and positioning effects correspond to Keegan et al. (2019), Van Gestel et al. (2017), Mikkelsen et al. (2021), and Vandenbroele et al. (2019). Additionally, default nudges are in line with Van Kleef et al. (2018), Bergeron et al. (2019), and Marques et al. (2020). The study also confirms the effectiveness of multi-component nudges, as suggested by Samek (2019), Vermote et al. (2020), Raghoebar et

al. (2019), and Marcano-Olivier et al. (2019). These links demonstrate strong support from previous research for the study's findings on food nudges.

While the present study offers meaningful insights into the acceptance of food nudges among individuals with Type 2 diabetes in Czechia, several limitations must be acknowledged to contextualize the scope and applicability of its findings.

This study provides important insights into the acceptance of food nudges among individuals with Type 2 diabetes in Czechia, but several limitations must be acknowledged. First, the use of convenience sampling and the overrepresentation of certain demographic groups (e.g., men and individuals over 26) limit the generalizability of the findings. Second, the predominance of non-digital nudges over digital ones may have influenced the overall preference results, making comparisons between the two types less reliable.

Third, the reliance on self-reported data introduces the potential for social desirability bias, as participants may have overstated acceptance of socially favorable interventions. The questionnaire method may introduce certain biases, as it relies on the subjective responses of participants. For this reason, its use is sometimes criticized by prominent naturalists (see de Waal, 2022). However, we do not consider the common objection from the natural sciences—that questioning should not be conflated with observation—as relevant in our context. It is difficult to imagine how the study of the effects of nudges could be meaningfully conducted through observation alone, without the use of questionnaires. The social sciences possess specific characteristics, such as the role of intentionality (see Winch, 2003), which cannot be adequately captured through observation alone.

Fourth, the cross-sectional nature of the study prevents conclusions about long-term behavioral impacts or causality. Moreover, while grounded in behavioral theories, the study does not directly examine psychological factors—such as trust, autonomy, or digital literacy—that may shape acceptance. Additionally, cultural and technological contexts specific to Czechia may limit the transferability of the findings to other countries. Finally, the digital nudges examined were basic, excluding more advanced or interactive formats that could yield different results.

Future research should use more representative samples, longitudinal methods, and a broader set of digital tools, while also investigating the psychological drivers of nudge acceptance to inform effective and inclusive health interventions.

Last but not least, it is important to acknowledge the existence of studies that express reservations about the use of nudges. For instance, Mols et al. (2015) point out that nudging can sometimes fail, which raises ethical concerns. In response to such criticism, we emphasize that no methodological approach is flawless. Nevertheless, these critiques serve as a valuable impetus for further scientific inquiry, as highlighted in various literature reviews. One recurring issue is the conceptual ambiguity surrounding the term "nudge." This lack of clarity is not unique to nudging but extends to many other research areas and theoretical constructs. Therefore, it is essential to explicitly

define both the extension and intention of key concepts within the theoretical framework, specifying their referents and denotations (see de Saussure; Ogden & Richards, 1923). Variations in how terms like "nudge" and "oppression" are used indicate divergent definitions, which may lead to differing interpretations and applications. This conceptual divergence can itself become a fruitful area for further investigation, for example, through a systematic literature review.

7. Conclusion

We analyzed the acceptance of different forms of nudge by Type 2 diabetics. For a coherent explanation of these changes (phenomena E), we used an explanatory model in which the nudge theory is the key explanatory theory. Of the 33 different forms of nudges tested, patients accepted the majority. Only four offered forms were below the threshold of acceptability (pledging doctors to reduce calorie intake, setting a calorie goal before online grocery shopping, text messages reminding people to eat healthily, and reducing portion sizes of meals in school and public canteens).

We found gender differences in non-digital nudges. Females deem the nudges more acceptable. They find digital nudges similarly acceptable. The following recommendation follows from this finding. When creating "nudging strategies" and selecting individual types of nudging incentives, health policy actors should consider different gender attitudes towards the means offered. Knowledge of the differentiation in the attitude towards the offered nudges will allow you to search for more effective nudging tools for individual patient segments. At the same time, this differentiation can achieve an overall higher effect on the entire segment of DM2 patients.

We also detect differentiation in acceptance of nudges in acceptance of food nudging depending on their age. It is also possible to make recommendations for the creation of an effective strategy in the fight against DM2 from this finding. Nudging ought to be targeted at individual segments of patients and not aimed undifferentiated at the entire group of diabetics.

Digital nudges are significantly less acceptable than non-digital ones by all the researched socio-demographic categories. This finding applies to all socio-demographic categories. The preference for non-technical nudges is probably influenced by several factors. One of them may be the very fact on which the nudge theory is based. Man is not a "purely rational" decisive being (homo economicus), but a complex socio-psychological and biological creature. His decision-making has the nature of complexity. Health policy actors, therefore, have a rich portfolio of nudging resources that they can use to create an effective health strategy focused on a healthy lifestyle and reducing prevalence.

The phenomenon of nudging opens up other research fields in this area. At the same time, nudging proves to be an acceptable tool that can be used to influence the

behavior of the target group of citizens in a socially desirable way and achieve the goals of public policies.

This does not mean that we completely reject the role of coercive means in health policy. From the recent history of the COVID-19 case, it is evident that a certain segment of patients may also prefer coercive means, such as mandatory vaccination. In this case, public trust in the government is a key factor. If people perceive the measures as legitimate and useful, they will be willing to accept stricter forms of regulation.

On the other hand, if nudging is perceived as manipulative, patients may view such an approach with distrust. Patients may feel manipulated or "unjustly punished." If the rules are strict, some patients with diabetes can play "hide and seek." This can manifest itself, for example, in the fact that they will hide their eating habits. There may also be psychological reactance, which manifests itself as resistance to coercion. This can induce the opposite behavior. This means that if patients feel restricted or compelled to perform a certain behavior, they may respond with resistance, even though it would be in their interest to change the behavior. In this case, patients may consciously reject the rules and recommendations of health policy and even act contrary to the intentions (goals) of public policy actors. This can manifest itself, for example, in the fact that they overestimate the "lost choice." If they perceive coercion by public policy as unfair, it can lead to a reduction in the authority of public policy actors.

Acknowledgement

The study was supported by the long-term institutional scientific research funding scheme in the Faculty of Finance and Accounting, Prague University of Economics and Business (IP 100040), by the Specific Higher Education Research (SVV 260 596).

References

Allan, J. L., & Powell, D. J. (2020). Prompting Consumers to Make Healthier Food Choices in Hospitals: A Cluster Randomised Controlled Trial. *International Journal of Behavioral Nutrition and Physical Activity, 17*(1). https://doi.org/10.1186/s12966-020-00990-z

Aman, A. M., Ng, W., Hao, F., Zhang, C., & Chon, K. K. S. (2025). Digital Nudge Persuasiveness of Avatars in Restaurants Toward Healthy Choices and Happy Diners. *Tourism Review, 80*(8), 1535–1557. https://doi.org/10.1108/tr-07-2024-0567

Anzman-Frasca, S., Braun, A. C., Ehrenberg, S., Epstein, L. H., Gampp, A., Leone, L. A., Singh, A., & Tauriello, S. (2018). Effects of a Randomized Intervention Promoting

Healthy Children's Meals on Children's Ordering and Dietary Intake in a Quick-Service Restaurant. *Physiology & Behavior*, *192*, 109–117. https://doi.org/10.1016/j.physbeh.2018.01.022

Attwood, S., Chesworth, S., & Parkin, B. (2020). Menu Engineering to Encourage Sustainable Food Choices when Dining out: An Online Trial of Priced-Based Decoys. *Appetite*, *149*, 104601. https://doi.org/10.1016/j.appet.2020.104601

Benito-Ostolaza, J. M., Echavarri, R., Garcia-Prado, A., & Oses-Eraso, N. (2021). Using Visual Stimuli to Promote Healthy Snack Choices among Children. *Social Science & Medicine, 270*, 113587. https://doi.org/10.1016/j.socscimed.2020.113587

Benson, T., Lavelle, F., Bucher, T., McCloat, A., Mooney, E., Egan, B., Collins, C. E., & Dean, M. (2018). The Impact of Nutrition and Health Claims on Consumer Perceptions and Portion Size Selection: Results from a Nationally Representative Survey. *Nutrients, 10*(5), 656. https://doi.org/10.3390/nu10050656

Bergeron, S., Doyon, M., Saulais, L., & Labrecque, J. (2019). Using Insights from Behavioral Economics to Nudge Individuals towards Healthier Choices when Eating out: A Restaurant Experiment. *Food Quality and Preference, 73*, 56–64. https://doi.org/10.1016/j.foodqual.2018.12.001

Bhaskara, G., Budhiarta, A. a. G., Gotera, W., Saraswati, M. R., Dwipayana, I. M. P., Semadi, I. M. S., Nugraha, I. B. A., Wardani, I. a. K., & Suastika, K. (2022). Factors Associated with Diabetes-Related Distress in Type 2 Diabetes Mellitus Patients. *Diabetes Metabolic Syndrome and Obesity, 15*, 2077–2085. https://doi.org/10.2147/dmso.s363431

Blom, S. S., Gillebaart, M., De Boer, F., Van Der Laan, N., & De Ridder, D. T. (2021). Under Pressure: Nudging Increases Healthy Food Choice in a Virtual Reality Supermarket, Irrespective of System 1 Reasoning. *Appetite, 160*, 105116. https://doi.org/10.1016/j.appet.2021.105116

Boehm, R., Read, M., Henderson, K. E., & Schwartz, M. B. (2020). Removing Competitive Foods v. Nudging and Marketing School Meals: A Pilot Study in High-school Cafeterias. *Public Health Nutrition, 23*(2), 366–373. https://doi.org/10.1017/s136898001900329x

Brauer, J. R., Tittle, C. R., & Antonaccio, O. (2017). The Costs of Coercive Control: Assessing Behavioral and Mental Health Correlates of Erratic and Oppressive Coercion. *Justice Quarterly, 36*(2), 255–286. https://doi.org/10.1080/07418825.2017.1403643

Brehm, J. W. (1966). *A Theory of Psychological Reactance.* Academic Press.

Britwum, K., & Yiannaka, A. (2019). Shaping Food Safety Perceptions: The Influence of Informational Nudges. *Journal of Behavioral and Experimental Economics, 81*, 139–151. https://doi.org/10.1016/j.socec.2019.06.007

Carroll, K. A., Samek, A., & Zepeda, L. (2018). Food Bundling as a Health Nudge: Investigating Consumer Fruit and Vegetable Selection Using Behavioral Economics. *Appetite, 121*, 237–248. https://doi.org/10.1016/j.appet.2017.11.082

Cerezo-Prieto, M., & Frutos-Esteban, F. J. (2021). Hacia Rutas Saludables: Efecto de las Etiquetas Nutricionales en las Conductas Alimentarias en un Comedor Universitario. *Atención Primaria, 53*(5), 102022. https://doi.org/10.1016/j.aprim.2021.102022

Cheung, T. T. L., Gillebaart, M., Kroese, F. M., Marchiori, D., Fennis, B. M., & De Ridder, D. T. D. (2019). Cueing Healthier Alternatives for Take-away: A Field Experiment on the Effects of (disclosing) Three Nudges on Food Choices. *BMC Public Health, 19*(1), 974. https://doi.org/10.1186/s12889-019-7323-y

Coffino, J. A., Udo, T., & Hormes, J. M. (2020). Nudging while Online Grocery Shopping: A Randomized Feasibility Trial to Enhance Nutrition in Individuals with Food Insecurity. *Appetite, 152*, 104714. https://doi.org/10.1016/j.appet.2020.104714

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied Behavior Analysis* (Vol. 2). Pearson/Merrill-Prentice Hall.

Coucke, N., Vermeir, I., Slabbinck, H., & Van Kerckhove, A. (2019). Show Me More! The Influence of Visibility on Sustainable Food Choices. *Foods, 8*(6), 186. https://doi.org/10.3390/foods8060186

Dalrymple, J. C., Radnitz, C., Loeb, K. L., & Keller, K. L. (2020). Optimal Defaults as a Strategy to Improve Selections from Children's Menus in Full-service Theme Park Dining. *Appetite, 152*, 104697. https://doi.org/10.1016/j.appet.2020.104697

De Waal, F. (2022). *Different: Gender Through the Eyes of a Primatologist*. W. W. Norton & Company.

Djupegot, I. L. (2019). Investigating Young Adults' Perceived Effectiveness of Textual Information about Food-related Nudging. *British Food Journal, 122*(2), 489–502. https://doi.org/10.1108/bfj-08-2019-0649

Eddy, J. M., Leve, L. D., & Fagot, B. I. (2001). Coercive Family Processes: A Replication and Extension of Patterson's Coercion Model. *Aggressive Behavior, 27*(1), 14–25. https://doi.org/10.1002/1098-2337(20010101/31)27:1<14::AID-AB2>3.0.CO;2-2

Erjavec, M., Williams, S., Viktor, S., & Marcano-Olivier, M. (2020). Nudge with Caution: Targeting Fruit and Vegetable Consumption in Primary Schools. *European Journal of Clinical Nutrition, 75*(4), 724–727. https://doi.org/10.1038/s41430-020-00772-7

Ewert, B. (2017). Promoting Health in Schools: Theoretical Reflections on the Settings Approach Versus Nudge Tactics. *Social Theory & Health, 15*(4), 430–447. https://doi.org/10.1057/s41285-017-0036-3

Fennis, B. M., Gineikiene, J., Barauskaite, D., & Van Koningsbruggen, G. M. (2020). Nudging Health: Scarcity Cues Boost Healthy Consumption among Fast Rather than Slow Strategists (and abundance cues do the opposite). *Food Quality and Preference, 85*, 103967. https://doi.org/10.1016/j.foodqual.2020.103967

Ferrannini, E., Muscelli, E., Frascerra, S., Baldi, S., Mari, A., Heise, T., Broedl, U. C., & Woerle, H. (2014). Metabolic Response to Sodium-glucose Cotransporter 2 Inhibition in Type 2 Diabetic Patients. *Journal of Clinical Investigation, 124*(2), 499–508. https://doi.org/10.1172/jci72227

Friedman, M., & Friedman, R. D. (1990). *Free to Choose: A Personal Statement.* Mariner Books.

Furukawa, S., Miyake, T., Miyaoka, H., Matsuura, B., & Hiasa, Y. (2022). Observational Study on Unhealthy Eating Behavior and the Effect of Sodium-Glucose Cotransporter 2 Inhibitors: The Luseogliflozin Ehime Diabetes Study. *Diabetes Therapy, 13*(5), 1073–1082. https://doi.org/10.1007/s13300-022-01261-9

Gajewski, J., Heimann, M., & Meunier, L. (2022). Nudges in SRI: The Power of the Default Option. *Journal of Business Ethics, 177*(3), 547–566. https://doi.org/10.1007/s10551-020-04731-x

Garnett, E. E., Balmford, A., Sandbrook, C., Pilling, M. A., & Marteau, T. M. (2019). Impact of Increasing Vegetarian Availability on Meal Selection and Sales in Cafeterias. *Proceedings of the National Academy of Sciences, 116*(42), 20923–20929. https://doi.org/10.1073/pnas.1907207116

Ghoniem, A., Van Dillen, L. F., & Hofmann, W. (2020). Choice Architecture Meets Motivation Science: How Stimulus Availability Interacts with Internal Factors in Shaping the Desire for Food. *Appetite, 155*, 104815. https://doi.org/10.1016/j.appet.2020.104815

Gonçalves, D., Coelho, P., Martinez, L. F., & Monteiro, P. (2021). Nudging Consumers toward Healthier Food Choices: A Field Study on the Effect of Social Norms. *Sustainability, 13*(4), 1660. https://doi.org/10.3390/su13041660

Grebitus, C., Roscoe, R. D., Van Loo, E. J., & Kula, I. (2020). Sustainable Bottled Water: How Nudging and Internet Search Affect Consumers' Choices. *Journal of Cleaner Production, 267*, 121930. https://doi.org/10.1016/j.jclepro.2020.121930

Grutzmacher, S. K., Duru, E. B., Speirs, K. E., Worthington, L., Munger, A. L., & Lachenmayr, L. A. (2018). Using Text Messages to Engage Low-income Parents in School-based Nutrition Education. *Journal of Hunger & Environmental Nutrition, 13*(3), 335–339. https://doi.org/10.1080/19320248.2017.1364196

Guzman, F. A., Hamstra, M. R., Escribano, P. I., & Fu, X. (2024). Employees' Attitudinal Reactions to Supervisors' Weekly Taking Charge Behavior: The Moderating Role of Employees' Proactive Personality. *Journal of Managerial Psychology, 39*(8), 993–1010. https://doi.org/10.1108/jmp-11-2023-0678

Hamdi, N., Ellison, B., McCaffrey, J., Metcalfe, J. J., Hoffman, A., Haywood, P., & Prescott, M. P. (2020). Implementation of a Multi-Component School Lunch Environmental Change Intervention to Improve Child Fruit and Vegetable Intake: A Mixed-Methods Study. *International Journal of Environmental Research and Public Health, 17*(11), 3971. https://doi.org/10.3390/ijerph17113971

Han, S. J., & Boyko, E. J. (2018). The Evidence for an Obesity Paradox in Type 2 Diabetes Mellitus. *Diabetes & Metabolism Journal, 42*(3), 179. https://doi.org/10.4093/dmj.2018.0055

Hansen, P. G., Schilling, M., & Malthesen, M. S. (2021). Nudging Healthy and Sustainable Food Choices: Three Randomized Controlled Field Experiments Using a Vegetarian Lunch-default as a Normative Signal. *Journal of Public Health, 43*(2), 392–397. https://doi.org/10.1093/pubmed/fdz154

Hausman, D. M., & Welch, B. (2010). Debate: To Nudge or not to Nudge*. *Journal of Political Philosophy, 18*(1), 123–136. https://doi.org/10.1111/j.1467-9760.2009.00351.x

Hawkins, L., Farrow, C., & Thomas, J. M. (2021). Does Exposure to Socially Endorsed Food Images on Social Media Influence Food Intake? *Appetite, 165*, 105424. https://doi.org/10.1016/j.appet.2021.105424

Hogreve, J., Matta, S., Hettich, A. S., & Reczek, R. W. (2020). How Do Social Norms Influence Parents' Food Choices for their Children? The Role of Social Comparison and Implicit Self-Theories. *Journal of Retailing, 97*(2), 173–190. https://doi.org/10.1016/j.jretai.2020.05.002

Holligan, S., Yi, S., Kanetkar, V., Haines, J., Dergham, J., Royall, D., & Brauer, P. (2019). Preferences for Vegetables among University Foodservice Users. *British Food Journal, 121*(12), 3338–3349. https://doi.org/10.1108/bfj-09-2018-0597

Huitink, M., Poelman, M. P., Van Den Eynde, E., Seidell, J. C., & Dijkstra, S. C. (2020). Social Norm Nudges in Shopping Trolleys to Promote Vegetable Purchases: A Quasi-experimental Study in a Supermarket in a Deprived Urban Area in the Netherlands. *Appetite, 151*, 104655. https://doi.org/10.1016/j.appet.2020.104655

Hupé, C., Larue, C., & Contandriopoulos, D. (2024). Defining Chemical Restraint: A Preliminary Step towards Measurement and Quality Assessment. *Aggression and Violent Behavior, 77*, 101926. https://doi.org/10.1016/j.avb.2024.101926

Immink, V., Kornelis, M., & Van Kleef, E. (2021). Vegetable Interventions at Unconventional Occasions: The Effect of Freely Available Snack Vegetables at Workplace Meetings on Consumption. *International Journal of Workplace Health Management, 14*(4), 426–439. https://doi.org/10.1108/ijwhm-06-2020-0108

Keegan, E., Kemps, E., Prichard, I., Polivy, J., Herman, C. P., & Tiggemann, M. (2019). The Effect of the Spatial Positioning of a Healthy Food Cue on Food Choice from a Pictorial-style Menu. *Eating Behaviors, 34*, 101313. https://doi.org/10.1016/j.eatbeh.2019.101313

Knowles, D., Brown, K., & Aldrovandi, S. (2019). Exploring the Underpinning Mechanisms of the Proximity Effect within a Competitive Food Environment. *Appetite, 134*, 94–102. https://doi.org/10.1016/j.appet.2018.12.005

Kosīte, D., König, L. M., De-Loyde, K., Lee, I., Pechey, E., Clarke, N., Maynard, O., Morris, R. W., Munafò, M. R., Marteau, T. M., Fletcher, P. C., & Hollands, G. J. (2019). Plate Size and Food Consumption: A Pre-registered Experimental Study in a General Population Sample. *International Journal of Behavioral Nutrition and Physical Activity, 16*(1), 75. https://doi.org/10.1186/s12966-019-0826-1

Kosters, M., & Van Der Heijden, J. (2015). From Mechanism to Virtue: Evaluating Nudge Theory. *Evaluation, 21*(3), 276–291. https://doi.org/10.1177/1356389015590218

Krpan, D., & Houtsma, N. (2020). To Veg or not to Veg? The Impact of Framing on Vegetarian Food Choice. *Journal of Environmental Psychology, 67*, 101391. https://doi.org/10.1016/j.jenvp.2020.101391

Kuhn, T. S. (2012). *The Structure of Scientific Revolutions. With an Introductory Essay by Ian Hacking.* The University of Chicago Press.

Lai, C., List, J. A., & Samek, A. (2019). Got Milk? Using Nudges to Reduce Consumption of Added Sugar. *American Journal of Agricultural Economics, 102*(1), 154–168. https://doi.org/10.1093/ajae/aaz022

Lakatos, I. (1978). The Methodology of Scientific Research Programmes. Philosophical Papers Vol. 1. J. Worrall & G. Currie (Eds.). https://doi.org/10.1017/CBO9780511621123

Lange, C., Schwartz, C., Hachefa, C., Cornil, Y., Nicklaus, S., & Chandon, P. (2020). Portion Size Selection in Children: Effect of Sensory Imagery for Snacks Varying in Energy Density. *Appetite, 150*, 104656. https://doi.org/10.1016/j.appet.2020.104656

Lin, X., Xu, Y., Pan, X., Xu, J., Ding, Y., Sun, X., Song, X., Ren, Y., & Shan, P. (2020). Global, Regional, and National Burden and Trend of Diabetes in 195 Countries and Territories: An Analysis from 1990 to 2025. *Scientific Reports, 10*(1), 14790. https://doi.org/10.1038/s41598-020-71908-9

Marcano-Olivier, M., Pearson, R., Ruparell, A., Horne, P. J., Viktor, S., & Erjavec, M. (2019). A Low-cost Behavioural Nudge and Choice Architecture Intervention Targeting School Lunches Increases Children's Consumption of Fruit: A Cluster Randomised Trial. *International Journal of Behavioral Nutrition and Physical Activity, 16*(1), 20. https://doi.org/10.1186/s12966-019-0773-x

Marques, I. C. F., Ting, M., Cedillo-Martínez, D., & Pérez-Cueto, F. J. (2020). Effect of Impulsivity Traits on Food Choice within a Nudging Intervention. *Nutrients, 12*(5), 1402. https://doi.org/10.3390/nu12051402

Maslow, A. H. (1998). Toward a Psychology of Being (3rd ed.). John Wiley & Sons.

Mazza, M. C., Dynan, L., Siegel, R. M., & Tucker, A. L. (2017). Nudging Healthier Choices in a Hospital Cafeteria: Results from a Field Study. *Health Promotion Practice, 19*(6), 925–934. https://doi.org/10.1177/1524839917740119

McAlister, A. R., & Kononova, A. (2020). Consumption of Fruits, Vegetables, and Nuts Can Be Increased When Multitasking with Screen Devices. *Health Communication, 37*(2), 141–151. https://doi.org/10.1080/10410236.2020.1827527

Mesas, A. E., Muñoz-Pareja, M., López-García, E., & Rodríguez-Artalejo, F. (2011). Selected Eating Behaviours and Excess Body Weight: A Systematic Review. *Obesity Reviews, 13*(2), 106–135. https://doi.org/10.1111/j.1467-789x.2011.00936.x

Michie, S., & West, R. (2012). Behaviour Change Theory and Evidence: A Presentation to Government. *Health Psychology Review, 7*(1), 1–22. https://doi.org/10.1080/17437199.2011.649445

Mikkelsen, B. E., Sudzina, F., Ørnbo, L. E., & Tvedebrink, T. D. O. (2021). Does Visibility Matter? – A Simple Nudge Reduces the Purchase of Sugar Sweetened Beverages in Canteen Drink Coolers. *Food Quality and Preference, 92*, 104190. https://doi.org/10.1016/j.foodqual.2021.104190

Mistura, M., Fetterly, N., Rhodes, R. E., Tomlin, D., & Naylor, P. (2019). Examining the Efficacy of a 'Feasible' Nudge Intervention to Increase the Purchase of Vegetables

by First Year University Students (17–19 years of age) in British Columbia: A Pilot Study. *Nutrients, 11*(8), 1786. https://doi.org/10.3390/nu11081786

Mohr, B., Dolgopolova, I., & Roosen, J. (2019). The Influence of Sex and Self-control on the Efficacy of Nudges in Lowering the Energy Content of Food during a Fast Food Order. *Appetite, 141*, 104314. https://doi.org/10.1016/j.appet.2019.06.006

Mols, F., Haslam, S. A., Jetten, J., & Steffens, N. K. (2015). Why a Nudge is not enough: A Social Identity Critique of Governance by Stealth. *European Journal of Political Research, 54*(1), 81–98. https://doi.org/10.1111/1475-6765.12073

Montagni, I., Prevot, F., Castro, Z., Goubel, B., Perrin, L., Oppert, J., & Fontvieille, A. (2020). Using Positive Nudge to Promote Healthy Eating at Worksite. *Journal of Occupational and Environmental Medicine, 62*(6), e260–e266. https://doi.org/10.1097/jom.0000000000001861

Morren, M., Mol, J. M., Blasch, J. E., & Malek, Ž. (2021). Changing Diets - Testing the Impact of Knowledge and Information Nudges on Sustainable Dietary Choices. *Journal of Environmental Psychology, 75*, 101610. https://doi.org/10.1016/j.jenvp.2021.101610

Mullett, T. (2022). What Are the Advantages and Disadvantages of Nudging? Warwick Business School. https://www.wbs.ac.uk/news/what-are-the-advantages-and-disadvantages-of-nudging/

Muñoz-Vilches, N. C., Van Trijp, H. C., & Piqueras-Fiszman, B. (2018). The Impact of Instructed Mental Simulation on Wanting and Choice between Vice and Virtue Food Products. *Food Quality and Preference, 73*, 182–191. https://doi.org/10.1016/j.foodqual.2018.11.010

Nagatomo, W., Saito, J., & Kondo, N. (2019). Effectiveness of a Low-value Financial-incentive Program for Increasing Vegetable-rich Restaurant Meal Selection and Reducing Socioeconomic Inequality: A Cluster Crossover Trial. *International Journal of Behavioral Nutrition and Physical Activity, 16*(1), 81. https://doi.org/10.1186/s12966-019-0830-5

Nijhawan, M., Singh, R., Nijhawan, A., Singh, R. P., & Saharan, S. (2014). Lifestyle, Obesity, Type of Personality Pattern, and Type-2 Diabetes Mellitus – Is there a Correlation? *Journal of Evolution of Medical and Dental Sciences, 3*(48), 11487–11499.

Ogden, C. K., & Richards, I. A. (1923). *The Meaning of Meaning*. Harcourt, Brace & World. https://avys.omu.edu.tr/storage/app/public/adem.caliskan/143872/6-Ogden_Richards_1923-The%20Meaning-of-Meaning-649.pdf

Ohlhausen, P., & Langen, N. (2020). When a Combination of Nudges Decreases Sustainable Food Choices Out-of-Home—The Example of Food Decoys and Descriptive Name Labels. *Foods, 9*(5), 557. https://doi.org/10.3390/foods9050557

Oliver, A. (2013). From Nudging to Budging: Using Behavioural Economics to Inform Public Sector Policy. *Journal of Social Policy, 42*(4), 685–700. https://doi.org/10.1017/s0047279413000299

Öztürk, A., & Arun, K. (2024). Nudge Theory on Intrapreneurship: A Conceptual View. *Journal of Entrepreneurship in Emerging Economies, 17*(2), 453–482. https://doi.org/10.1108/jeee-09-2023-0355

Ozturk, O. D., Frongillo, E. A., Blake, C. E., McInnes, M. M., & Turner-McGrievy, G. (2020). Before the Lunch Line: Effectiveness of Behavioral Economic Interventions for Pre-commitment on Elementary School Children's Food Choices. *Journal of Economic Behavior & Organization, 176*, 597–618. https://doi.org/10.1016/j.jebo.2020.03.027

Parker, S. K., Bindl, U. K., & Strauss, K. (2010). Making Things Happen: A Model of Proactive Motivation. *Journal of Management, 36*(4), 827–856. https://doi.org/10.1177/0149206310363732

Parker, S. K., Wang, Y., & Liao, J. (2018). When is Proactivity Wise? A Review of Factors that Influence the Individual Outcomes of Proactive Behavior. *Annual Review of Organizational Psychology and Organizational Behavior, 6*(1), 221–248. https://doi.org/10.1146/annurev-orgpsych-012218-015302

Peng-Li, D., Byrne, D. V., Chan, R. C., & Wang, Q. J. (2020). The Influence of Taste-congruent Soundtracks on Visual Attention and Food Choice: A Cross-cultural Eye-tracking Study in Chinese and Danish Consumers. *Food Quality and Preference, 85*, 103962. https://doi.org/10.1016/j.foodqual.2020.103962

Petit, O., Velasco, C., & Spence, C. (2018). Are Large Portions Always Bad? Using the Delboeuf illusion on Food Packaging to Nudge Consumer Behavior. *Marketing Letters, 29*(4), 435–449. https://doi.org/10.1007/s11002-018-9473-6

Policastro, P., Palm, T., Schwartz, J., & Chapman, G. (2017). Targeted Calorie Message Promotes Healthy Beverage Consumption Better than Charity Incentive. *Obesity, 25*(8), 1428–1434. https://doi.org/10.1002/oby.21885

Raghoebar, S., Van Rongen, S., Lie, R., & De Vet, E. (2019). Identifying Social Norms in Physical Aspects of Food Environments: A Photo Study. *Appetite, 143*, 104414. https://doi.org/10.1016/j.appet.2019.104414

Reinoso-Carvalho, F., Campo, R., De Luca, M., & Velasco, C. (2021). Toward Healthier Cookie Habits: Assessing the Role of Packaging Visual Appearance in the

Expectations for Dietary Cookies in Digital Environments. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.679443

Robinson, E., & Kersbergen, I. (2018). Portion Size and Later Food Intake: Evidence on the "Normalizing" Effect of Reducing Food Portion Sizes. *American Journal of Clinical Nutrition, 107*(4), 640–646. https://doi.org/10.1093/ajcn/nqy013

Rogozińska-Pawełczyk, A., & Wiktorowicz, J. (2024). The Development and Validation of the Individual Knowledge Worker Proactivity Scale – an Example from the Business Services Sector. *Evidence-based HRM a Global Forum for Empirical Scholarship*. https://doi.org/10.1108/ebhrm-01-2023-0024

Samek, A. (2019). Gifts and Goals: Behavioral Nudges to Improve Child Food Choice at School. *Journal of Economic Behavior & Organization, 164*, 1–12. https://doi.org/10.1016/j.jebo.2019.05.008

Saulais, L., Massey, C., Perez-Cueto, F. J., Appleton, K. M., Dinnella, C., Monteleone, E., Depezay, L., Hartwell, H., & Giboreau, A. (2019). When are "Dish of the Day" Nudges most Effective to Increase Vegetable Selection? *Food Policy, 85*, 15–27. https://doi.org/10.1016/j.foodpol.2019.04.003

Sogari, G., Li, J., Lefebvre, M., Menozzi, D., Pellegrini, N., Cirelli, M., ... & Mora, C. (2019). The influence of health messages in nudging consumption of whole grain pasta. *Nutrients*, *11*(12), 2993.

Starke, A. D., Willemsen, M. C., & Trattner, C. (2021). Nudging Healthy Choices in Food Search through Visual Attractiveness. *Frontiers in Artificial Intelligence, 4*. https://doi.org/10.3389/frai.2021.621743

Sutton, D., Wilson, M., Van Kessel, K., & Vanderpyl, J. (2013). Optimizing Arousal to Manage Aggression: A Pilot Study of Sensory Modulation. *International Journal of Mental Health Nursing, 22*(6), 500–511. https://doi.org/10.1111/inm.12010

Terrill, W., Paoline, E. A., & Manning, P. K. (2003). Police Culture and Coercion*. *Criminology, 41*(4), 1003–1034. https://doi.org/10.1111/j.1745-9125.2003.tb01012.x

Thaler, R. H., & Sunstein, C. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press.

Thunström, L., Gilbert, B., & Ritten, C. J. (2018). Nudges that Hurt those Already Hurting – Distributional and Unintended Effects of Salience Nudges*. *Journal of Economic Behavior & Organization, 153*, 267–282. https://doi.org/10.1016/j.jebo.2018.07.005

Tijssen, I., Zandstra, E. H., De Graaf, C., & Jager, G. (2017). Why a 'light' Product Package Should not Be Light Blue: Effects of Package Colour on Perceived Healthiness and

Attractiveness of Sugar- and Fat-reduced Products. *Food Quality and Preference, 59*, 46–58. https://doi.org/10.1016/j.foodqual.2017.01.019

Tonkin, M., Kemps, E., Prichard, I., Polivy, J., Herman, C. P., & Tiggemann, M. (2019). It's All in the Timing: The Effect of a Healthy Food Cue on Food Choices from a Pictorial Menu. *Appetite, 139*, 105–109. https://doi.org/10.1016/j.appet.2019.04.026

Van Bavel, R., Rodríguez-Priego, N., Vila, J., & Briggs, P. (2018). Using Protection Motivation Theory in the Design of Nudges to Improve Online Security Behavior. *International Journal of Human-Computer Studies, 123*, 29–39. https://doi.org/10.1016/j.ijhcs.2018.11.003

Van Den Enden, G., & Geyskens, K. (2021). Attract the Best: The Attraction Effect as an Effective Strategy to Enhance Healthy Choices. *PLoS ONE, 16*(11), e0259521. https://doi.org/10.1371/journal.pone.0259521

Van Dijk, R. J. L., & Bernstein, J. S. (2025). Kantian Political Philosophy, Coercion, and Public Health. *Bioethics News*. https://doi.org/10.1007/s40592-025-00239-0

Van Gestel, L., Kroese, F., & De Ridder, D. (2017). Nudging at the Checkout Counter – A Longitudinal Study of the Effect of a Food Repositioning Nudge on Healthy Food Choice. *Psychology and Health, 33*(6), 800–809. https://doi.org/10.1080/08870446.2017.1416116

Van Kleef, E., Kremer, F., & Van Trijp, H. C. M. (2020). The Impact of a Gradual Healthier Assortment among Vocational Schools Participating in a School Canteen Programme: Evidence from Sales and Student Survey Data. *International Journal of Environmental Research and Public Health, 17*(12), 4352. https://doi.org/10.3390/ijerph17124352

Van Kleef, E., Seijdell, K., Vingerhoeds, M. H., De Wijk, R. A., & Van Trijp, H. C. (2018). The Effect of a Default-based Nudge on the Choice of Whole Wheat Bread. *Appetite, 121*, 179–185. https://doi.org/10.1016/j.appet.2017.11.091

Vandenbroele, J., Slabbinck, H., Van Kerckhove, A., & Vermeir, I. (2019). Mock Meat in the Butchery: Nudging Consumers toward Meat Substitutes. *Organizational Behavior and Human Decision Processes, 163*, 105–116. https://doi.org/10.1016/j.obhdp.2019.09.004

Venema, T. A., Kroese, F. M., Verplanken, B., & De Ridder, D. T. (2020). The (bitter) Sweet Taste of Nudge Effectiveness: The Role of Habits in a Portion Size Nudge, a Proof of Concept Study. *Appetite, 151*, 104699. https://doi.org/10.1016/j.appet.2020.104699

Vermote, M., Nys, J., Versele, V., D'Hondt, E., Deforche, B., Clarys, P., & Deliens, T. (2020). The effect of Nudges Aligned with the Renewed Flemish Food Triangle on the Purchase of Fresh Fruits: An On-campus Restaurant Experiment. *Appetite, 144*, 104479. https://doi.org/10.1016/j.appet.2019.104479

Victoor, A., Delnoij, D. M., Friele, R. D., & Rademakers, J. J. (2012). Determinants of Patient Choice of Healthcare Providers: A Scoping Review. *BMC Health Services Research, 12*(1). https://doi.org/10.1186/1472-6963-12-272

Walker, L. A., Chambers, C. D., Veling, H., & Lawrence, N. S. (2019). Cognitive and Environmental Interventions to Encourage Healthy Eating: Evidence-based Recommendations for Public Health Policy. *Royal Society Open Science, 6*(10), 190624. https://doi.org/10.1098/rsos.190624

Wan, X., Qiu, L., & Wang, C. (2021). A Virtual Reality-based Study of Color Contrast to Encourage more Sustainable Food Choices. *Applied Psychology Health and Well-Being, 14*(2), 591–605. https://doi.org/10.1111/aphw.12321

Winch, P. (2003). *The Idea of a Social Science and Its Relation to Philosophy* (2nd ed.). Routledge. https://inthespaceofreasons.pbworks.com/f/Winch%2BThe-idea-of-a-social-science-and-its-relation-to-philosophy.pdf

Wyse, R., Gabrielyan, G., Wolfenden, L., Yoong, S., Swigert, J., Delaney, T., Lecathelinais, C., Ooi, J. Y., Pinfold, J., & Just, D. (2019). Can Changing the Position of Online Menu Items Increase Selection of Fruit and Vegetable Snacks? A Cluster Randomized Trial within an Online Canteen Ordering System in Australian Primary Schools. *American Journal of Clinical Nutrition, 109*(5), 1422–1430. https://doi.org/10.1093/ajcn/nqy351

Yi, B., Huang, G., & Zhou, Z. (2016). Different role of zinc transporter 8 between type 1 diabetes mellitus and type 2 diabetes mellitus. *Journal of Diabetes Investigation, 7*(4), 459–465. https://doi.org/10.1111/jdi.12441

Zeballos, E., Mancino, L., & Lin, B. (2020). Does how You Pay Influence the Share of Healthy Items that You Buy? Assessing Differences in Nutritional Quality of Food Purchases by Payment Type. *Food Policy, 92*, 101886. https://doi.org/10.1016/j.foodpol.2020.101886

Zhou, X., Perez-Cueto, F. J., Santos, Q. D., Bredie, W. L., Molla-Bauza, M. B., Rodrigues, V. M., Buch-Andersen, T., Appleton, K. M., Hemingway, A., Giboreau, A., Saulais, L., Monteleone, E., Dinnella, C., & Hartwell, H. (2019). Promotion of Novel Plant-based Dishes among Older Consumers Using the 'Dish of the Day' as a Nudging Strategy in 4 EU Countries. *Food Quality and Preference, 75*, 260–272. https://doi.org/10.1016/j.foodqual.2018.12.003