The use of nudging strategies in obesity management

A scoping review

Robert Renter, Sarah Forberger, Anna Floegel

Abstract

Background: Nudging interventions aimed to promote healthy dietary behavior have not yet been included into relevant medical guidelines for the prevention and treatment of obesity in Germany. Thus, the objective of this study was to systematically identify existing nudging interventions for adults in the context of obesity therapy and to assess their effectiveness. **Methods:** A systematic literature search was conducted a priori following the critically appraised topic (CAT) approach. Three databases were searched over a 15-year period, yielding 959 publications. In total, seven studies were included, and information was extracted based on the PICOC schema. **Results:** All included studies originated from the United States and showed mixed results regarding the effectiveness of nudging among individuals with overweight or obesity. While some studies reported positive effects on body weight reduction and the promotion of healthier eating habits, the study designs were heterogeneous and insufficiently examined long-term effects. **Discussion:** Long-term studies with a larger sample size and in non-US regions are needed to evaluate the effectiveness and sustainability of nudging strategies in obesity treatment.

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Introduction

Obesity is a chronic disease that poses serious physical and psychological health risks for those affected [1–5]. The high and steadily rising prevalence of overweight and obesity worldwide has made it both a societal challenge and a major public health concern of our time [6, 7]. Recent studies indicate that 54% of the German population is overweight (including obesity), and 19% meet the criteria for obesity [8]. This situation was further exacerbated by the COVID-19 pandemic [9]. The financial consequences for the healthcare system are immense: in Germany, the annual costs for treating obesity, including comorbidities, are estimated at around €63 billion [10].

Nudging interventions, that encourage individuals towards health-promoting behaviors, could serve as a cost-effective addition to conventional treatment options for overweight and obesity. Outside the specific treatment context, nudges have already been used frequently in the field of nutrition and have shown positive effects [11–14], especially in reinforcing healthy behaviors in schools, supermarkets, office buildings, hospitals, restaurants, cafeterias, or military facilities [12]. These interventions have the potential to increase healthy choices regarding a balanced diet and healthier food selection by an average of up to 15% (95% confidence interval: 8%–23%) [14], and they may also help reduce total energy intake [14]. However, these findings do not explicitly focus on individuals with overweight or obesity. Nutrition goals of nudging interventions include influencing food choices and portion sizes, as well as affecting product selection and purchase decisions [11–14].

The concept of nudging operates through spatial, visual, linguistic, physical, emotional, and social modifications of the environment at the moment a decision is made [15]. According to

Thaler and Sunstein (2008), who developed the concept of nudges, decisions are often made automatically and without conscious deliberation [16], governed by the so-called automatic system [17]. This is frequently the case with dietary decisions, making it possible to influence the likelihood that people with overweight or obesity will make therapy-supporting choices. Obesity is a condition partly attributable to individuals' behaviors and habits. The broader therapeutic application of nudging could offer inherent benefits in a process-oriented nutrition therapy approach, such as the German Nutrition Care Process [18]. Conventional obesity treatment approaches usually combine dietary, behavioral, and exercise therapies. Established behavioral therapy measures include self-monitoring of behavior and progress, stimulus control, modification of dysfunctional thought patterns, goal-setting, problem-solving training, and social skills training [19]. However, nudging approaches have so far not been mentioned in current medical guidelines for obesity therapy [19–26].

Research question

The potential offered by nudging raises the question of whether nudging interventions could be beneficial in treating overweight and obesity in adults. Therefore, this study aimed to provide an overview of existing nudging interventions and their effects in individuals with obesity using a systematic review approach.

Methodology

We followed the critically appraised topic (CAT) approach [27] as a guideline for the systematic search. In the first step, the research question was formulated using the PICOC schema (**P**opulation, **I**ntervention, **C**omparison, **O**utcome, and **C**ontext) (◆ Table 1) [27, 28]. The search strategy was then applied to three selected scientific databases: PubMed, the American Psychological Association (APA), and PSYNDEX. PubMed covers biomedical literature, whereas PSYNDEX and APA emphasize psychological and behavioral science research. The combination of these databases provided robust, comprehensive coverage of both medical and psychological perspectives.
The search period spanned 15 years (January 1, 2006–December 31, 2021), encompassing the development of the nudging concept since it first gained prominence. This timeframe ensured a wide variety of methodological approaches and studies, enabling a comprehensive and nuanced view of nudging interventions and their effectiveness. Screening took place over about six weeks (June 10–July 25, 2022). During this process, titles and abstracts were reviewed based on the inclusion and exclusion criteria. In the next step, the full texts of the remaining studies were assessed. Studies that did not meet the inclusion criteria were excluded at each stage, with the reasons documented. The inclusion and exclusion criteria are described in detail in ◆ Tables 2 and 3.
Subsequently, all full texts were examined according to the nudging taxonomy of Krisam et al. (2017) [15]. We included texts describing interventions with the following characteristics:

- linking options that are not welfare-maximizing to trivial costs
- presentation of options (framing)
- altering default rules
- adapting aesthetic or atmospheric aspects of an environment (ambience)
- modifying functional aspects of an environment (functional design)
- labelling or presenting information on products or at the decision point (labelling)
- modifying the sensory properties or visual appearance of a product (presentation)
- adjusting the size or quantity of a product (dimensioning)
- offering additional behavioral options (availability)

PICOC	Key question	Search terms
Population	presence of overweight or obesity (BMI ≥ 25–50 kg/m²) in adults	(obes* OR overweight* OR weight loss OR weight management*) AND
Intervention	changes in the decision architecture according to the nudging taxonomy	(nudg* OR behavioral economic* OR behavioural economic* OR behavioral insight* OR behavioural insight* OR choice architecture*) AND
Comparison/ Control	nudging[a]/no nudging	
Outcome	effects on dietary or health-related behaviors	(food choice* OR dietary therapy* OR Behavio* OR health behaviour*)
Context	treatment of obesity in various settings	

Tab. 1: **Classification of search terms according to the PICOC scheme**
[a] Based on the overview of the nudging taxonomy by Krisam et al. (2017) [15]
BMI: body mass index
Using Boolean operators (AND, OR, NOT), multiple search terms were combined [28]. When using AND, only articles containing both search terms were retrieved, thus forming the intersection of at least two result sets. The OR operator yielded articles containing at least one of the specified terms. The NOT operator, which includes only the first term and excludes the second (e.g., "weight loss" NOT "overweight") [28], was not employed. Parentheses were used to combine multiple queries with explicit operator binding [28], for example: ("nudging" OR "behavioural economic") AND obese. To search for different word variations sharing the same stem, wildcards (truncations) were used. In the databases queried, truncation is indicated at the end of a word stem with an asterisk (*) [41]. For instance, protect* retrieves protect, protection, protective, and protects.

Inclusion criterion	Details
Date	publications released between January 1, 2006, and December 31, 2021 (15 years)
Population	individuals > 18 years of age, BMI ≥ 25–50 kg/m²
Language	articles published in English
Study type	quantitative, empirical studies
Study design	clinical studies, randomized clinical trials, randomized controlled clinical trials, and other human intervention studies, reviews, systematic reviews, and meta-analyses of intervention studies
Measurements	dietary or health-related behaviors, and where applicable BMI, body weight, or other clinically relevant obesity parameters
Outcome	effects on dietary or health-related behaviors
Context	therapeutic context, obesity therapy

Tab. 2: **Overview of inclusion criteria of studies based on the critically appraised topic (CAT)**
BMI: body mass index

Exclusion criteria	Details
Population	individuals < 18 years of age; BMI <25 kg/m² or > 50 kg/m²s hospitalized patients, eating disorders such as anorexia, bulimia, or binge eating disorder, severe mental illnesses
Outcome	outcomes unrelated to dietary or health-related behaviors, and those concerning substance-related addictions (alcohol, tobacco, drugs)
Access	studies without full-text availability

Tab. 3: **Overview of exclusion criteria of studies based on the critically appraised topic (CAT)**
BMI: body mass index

- changing the amount of effort associated with certain choices (proximity)
- influencing unconscious decisions via key stimuli (priming)
- providing general information to raise awareness of certain behaviors (prompting)

During the review of the full texts, all behavior measures that did not match the nudging taxonomy were excluded, resulting in a relatively high exclusion rate (n = 53). Although behavior change plays a key role in obesity treatment and measures of behavior change are widely reported in many studies, they often do not fulfil the requirements of the nudging taxonomy.

Screening and data extraction were conducted by a single individual (as part of a thesis) and were not double-checked by a second reviewer. Results are presented in text and in an evidence table.

Assessment of study quality

To evaluate study quality, we applied the classification of evidence levels AA, A, B, C, D, and E (in descending order of quality) [29]. Of the studies presented in the following section, n = 5 randomized controlled trials (RCTs) received an evidence level of A. One systematic review, which was not based solely on RCTs, was assigned an evidence level of B, and one controlled study was classified with an evidence level of C.

Results

The search yielded 959 publications (◆ Figure 1). Of these, n = 590 were found in PubMed, n = 22 in PSYNDEX, and n = 347 in the APA database. Based on the title and abstract screening, n = 647 publications were excluded due to a lack of nudging-related content, and n = 199 were excluded because of an unsuitable population. Consequently, n = 113 studies were selected for full-text screening. During this phase, n = 53 publications were excluded due to the absence of a nudging intervention, and n = 28 for falling outside the relevant body mass index (BMI) range. In two cases, full-text access was unavailable, and one study did not involve a human therapeutic context. These publications were also excluded. Overall, n = 7 publications were included in the final analysis. The entire process is illustrated in a PRISMA flowchart in ◆ Figure 1.

◆ Table 4 provides an overview of previous studies that employed nudging interventions in adult obesity therapy.

The included studies are summarized in ◆ Table 4. They were published between 2012 and 2021.

The included studies involved a mean sample size of approximately 500 participants, with the smallest having n = 201 [33] and the largest n = 1,672 [37], excluding the systematic review. Study participants were mothers with children [30], employees [31, 36, 37], and individuals in private households [31–34]. One study focused exclusively on women [30], while all others included male and female participants. All seven studies were conducted in the United States. The interventions took place in the home environment [31–33], in a workplace setting [31, 36, 37], or were location-independent [34]. In one study, a specially constructed environment was used for the study design [30].

Interventions from the nudging taxonomy [15] included modifying the ambience; introducing default rules (i.e., standard options that apply unless an alternative is chosen), adjusting product dimensions (e.g., packaging or portion sizes), framing (e.g., providing information on food safety or a child's obesity risk), changing the functional design (e.g., sizes of dishes and utensils), priming (using stimuli to influence behavior), prompting (providing information or cues), modifying

proximity, creating additional behavioral options; and increasing availability (e.g., storing predominantly healthy foods) [30–37].

Methods applied in these studies encompassed counseling and education sessions, project websites, information booths, coaching sessions, home visits, financial incentive programs [31, 32, 36, 37], and risk communication (e.g., regarding unhealthy behavior and familial obesity risk) [30]. Additional approaches aimed at increasing physical activity and involved environmental adjustments (e.g., use of smaller dishes and cups), farmers' markets, cafeteria or stairwell signage, posters promoting healthy diets, free sports magazine subscriptions, treadmills or stationary bikes, hiking groups, and the distribution of pedometers and scales [33, 34, 36, 37]. Other modifications included increased availability of healthy foods, changes in packaging sizes, and price increases for certain foods in cafeterias or vending machines [37].

Further methods included positive self-affirmation, price reductions, behavior therapy strategies such as cognitive restructuring and problem-solving, contracts to change eating behaviors, dietary guidelines, and goal-setting [32–34]. Endpoints measured across the studies included BMI, weight loss, waist circumference, total energy expenditure, total energy intake (kcal), self-reported dietary intake, distraction-free meal consumption (e.g., eating without watching television), the impact of reward cues on decision-making, fat intake, consumption of individual foods (e.g., fruit, vegetables, unhealthy snacks, or healthy foods in general), healthier beverage choices, healthier cooking methods, household food supplies, and time spent at a virtual buffet [30–37]

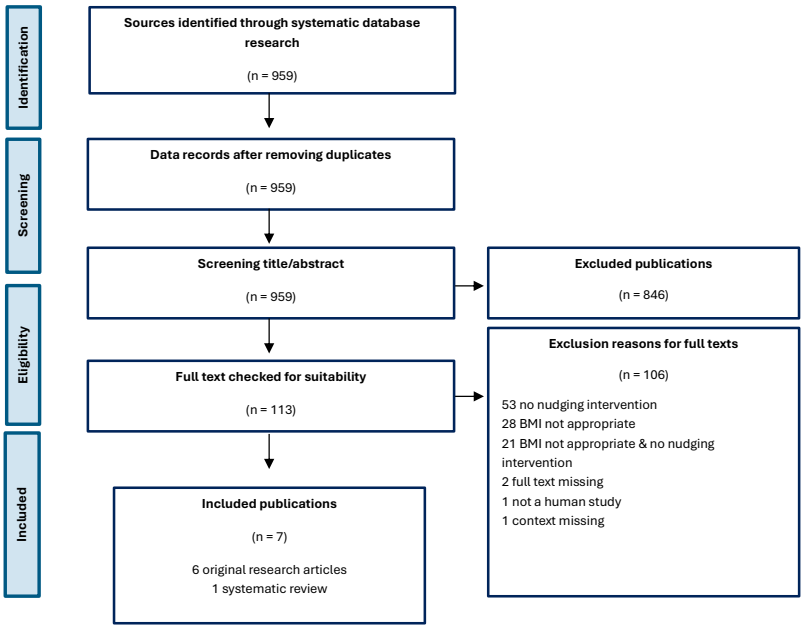

Fig. 1: **PRISMA flowchart of the literature research**

Examples of successful nudging interventions

In the study by Cornelius et al. [33] (n = 201), the nudging interventions implemented in the home food environment led to greater weight loss at month 6 compared to the control group (–9.1 ± 0.7 vs. –6.8 ± 0.7 kg, p = 0.017). However, this difference was no longer observed at month 18 (–7.3 ± 1.0 vs. –5.5 ± 1.0 kg, p = 0.19).

The interventions included a monthly "Cabinet Cleanout", where participants were instructed to locate and remove foods high in energy and fat. In a subsequent activity, "Filling Up with Fit-Foods", these items were replaced with healthier options. By changing the availability and proximity of both healthy and unhealthy foods, this intervention fit the nudging taxonomy [15]. Specifically, it focused on altering the placement of objects or stimuli and modifying their availability. Another nudging measure in the same category involved providing a cookbook of energy-reduced recipes and a subscription to a magazine featuring healthy meal ideas. Classified as prompting (the provision of information and cues), additional strategies included subscriptions to a fitness magazine, exercise videos, resistance bands (elastic bands for workouts), and motivational posters for healthy eating. Prompting also encompassed the use of digital body weight scales and a full-length mirror placed in a highly visible location to draw participants' attention to the consequences of their dietary and physical activity choices. Lastly, nudges falling under functional design (the alteration of functional aspects of the environment) were employed by providing appropriately sized dishes and glasses, a kitchen scale, measuring cups, and measuring spoons.

In the six-week study by Kegler et al. (2012), the "Home Food and Activity Environment" approach also focused on the home environment (n = 162 households with two persons each). The aim was to create a home setting that promoted healthy eating and physical activity. For the participatory selection of health-promoting environmental changes, a checklist of healthy measures was used. These included the storage of predominantly healthy foods in the household (availability and proximity of [un]healthy foods), the use of healthy cooking methods (prompting, provision of information), the purchase of mostly healthy and fresh foods (availability and proximity of [un]healthy foods), shared family meals without the television (ambience: changing aesthetic or atmospheric aspects of an environment), and reducing the consumption of unhealthy foods in restaurants (no nudge).

Author/year/study design	Context	Population	Intervention (type/setting)
Marcum et al. (2018) [30] **RCT/evidence level: A**	buffet environment based on virtual reality, information-based intervention	• n = 221 • mothers (> 18 years) with at least one child (4–5 years old) • mothers' BMI ≥ 30 kg/m²	• group A: information on food safety • group B: information on behavioral risk for obesity • group C: Information on behavioral risk plus information on the child's personal family obesity risk
Glanz et al. (2021) [31] **RCT/evidence level: A**	professional and home environment	• n = 344 • adult employees • BMI 30–55 kg/m2	• group 1: financial incentives • group 2: environmental modification (based on Kegler et al., 2012, see next line) • group 3: combined incentive + environment • group 4: control group
Kegler et al. (2012) [32] **RCT/evidence level: C**	home environment	• U.S. citizens • households (n = 162) with two people per household • BMI 22–58 kg/m²	• home visits + coaching calls • goal setting • behavior change techniques • tailored profile of the home environment (availability, additional options for action, ambiance, prompting) • n = 80 intervention households and n = 42 comparison households, n = 40 dropouts
Cornelius et al. (2016) [33] **RCT/evidence level: A**	home environment	• n = 201 • U.S. citizens • households with at least two people per household • BMI 25–50 kg/m² • partner also obese	• group 1: standard behavioral weight loss treatment (BWL) • group 2: BWL plus home environment modifications (BWL + H) BWL included self-monitoring, goal setting, cognitive restructuring, problem-solving, and increasing physical activity, along with a diet of 1,200–1,800 kcal/day and 30% fat BWL + H received items designed to facilitate healthy choices at home (e.g., exercise equipment, portion control signs, motivational posters)
Phillips-Caesar et al. (2015) [34] *results published in:* **Phillips-Caesar et al. (2017) [35]** **RCT/evidence level: A**	home environment + location-independent	• n = 405 • U.S. citizens • measured BMI of 25–50 kg/m²	• thirteen dietary strategies for small changes (small change eating intervention) • physical activity • goal-setting discussion • positive self-affirmation • behavioral contracts for dietary change • private home environment
Cairns et al. (2014) [36] **Systematic Review/ evidence level: B**	professional environment	• workplace intervention • four studies on environmental changes in the workplace • obese population • USA • effects of a mixed intervention for weight loss	behavioral measures (e.g., exercises, counseling, and education) as well as environmental measures (e.g., stairwell signage, cafeteria signage, farmers' markets, walking groups, better access to healthy foods, beautification of stairwells, free pedometers, the opportunity to self-weigh on-site)
Linde et al. (2012) [37] **RCT/evidence level: A**	professional environment	• n = 1,672 • employees at the workplace (large-site locations) • baseline BMI of 28.5 kg/m² • urban area, USA	• modification of the work environment to reduce BMI • environmental components (availability and price of food, promotion of physical activity, access to scales, and improvement of media) • increase in the availability of calorie-conscious foods in cafeterias and vending machines • reduction in the price of calorie-conscious foods by 15%, while simultaneously increasing the price of non-calorie-conscious foods by 15% • offering smaller portion sizes as replacements (e.g., 12-oz soda cans as replacements for 20-oz bottles in vending machines or cafeteria lines) • labeling calorie-conscious products at point of sale and promoting these products through table tents in the cafeteria and posters near vending machines

Tab. 4: **Overview of studies evaluating nudging interventions for obesity management in adults**
BMI: body mass index; BWL: behavioral weight-loss; 95% CI: 95% confidence interval; RCT: randomized controlled study; SD: standard deviation

In the intervention households, statistically significant improvements were observed regarding the availability of fruits and vegetables, unhealthy snacks, and healthy beverages. From the baseline examination to month 2, an average of 2.9 more servings of fruits and vegetables were available in the household in the intervention group, compared to only 0.9 in the control group. Other relevant and statistically significant changes included im-

	Comparison/Control	Outcome	Results
	after receiving the information: • selection and composition of a lunch meal for the child by the mothers • selection of virtual portions of foods and beverages	• energy (kcal) of the selected meal • time spent at the buffet • dynamic effects induced by the environment	• group C consumed on average 45 kcal less than Group A (SD not reported, $p < 0.05$) • group B consumed on average 35 kcal less than Group A (SD not reported, not statistically significant). • no statistically significant difference in time spent at the buffet. • no statistically significant difference in the selection of healthy vs. less healthy foods.
	weight loss in the groups after 18 months and 24 months	primary endpoint: body weight	After 18 months, no statistically significant differences between the groups compared to Group 4 in terms of mean weight loss. In trend, Group 1: –2.5 kg (95% CI –5.1 to 0.2 kg), Group 2: –1 kg (95% CI –3.5 to 1.5 kg), and Group 3: –1.1 kg (95% CI –3.7 to 1.5 kg) weight loss.
	• availability of (healthy) foods in the household • grocery shopping • restaurant visits • food preparation • family meals and television • family support for healthy eating • fruit and vegetable consumption • fat intake	• food stocks in the household • purchase and consumption of fruits and vegetables • healthier meal preparation • meals without television • fat consumption • body weight	Statistically significant differences in several areas, including food stock and healthier grocery shopping, such as changes in the stock of fruits and vegetables ($p = 0.03$), unhealthy snacks ($p < 0.01$), and healthy beverages ($p = 0.02$). An increase in fruit and vegetable consumption by 0.6 servings per day (SD not reported).
	baseline BMI, similarities in changes over time, and the influence of the partner's baseline BMI on one's own BMI change over time type of available foods, quantity and type of fitness equipment, availability of scales, full-length mirrors, and health-oriented magazines	• body weight and BMI • fat and total energy intake • self-reported diet • physical activity	<u>after 6 months (M6):</u> greater weight loss in BWL + H compared to BWL (–9.1 ± 0.7 vs. –6.8 ± 0.7 kg, $p = 0.017$). <u>after 18 months (M18):</u> no statistically significant difference in weight loss between BWL + H and BWL (–7.3 ± 1.0 vs. –5.5 ± 1.0 kg, $p = 0.19$). <u>M6 & M18:</u> BWL + H participants showed a greater reduction in dietary fat intake compared to BWL participants, with no difference in total energy intake or total energy expenditure.
	• three-phase approach with mixed methods • two groups: 1. small change eating strategies + physical activity (PA) **and** 2. small change eating strategies + physical activity + positive self-affirmation (PA/SA)	body weight loss	• development of an "Eating Strategy Matrix" intention-to-treat analysis (n = 405): no statistically significant difference in mean body weight loss between the PA group (1.1 ± 4.6%) and the PA/SA group (1.2 ± 4.3%) per protocol analysis (n = 248): body weight loss of 1.9 ± 5.4% (PA) **and** 1.8 ± 4.9% (PA/SA) no statistically significant difference between the two groups
		• BMI • body weight • waist circumference	• study quality regarding environmental measures is low • results are inconclusive
	• two-year intervention and control group with no contact	• changes at the workplace level • measurement of height and weight • online surveys on individual food intake and physical activity • detailed assessment of the work environment	• body weight not significantly affected • increase in BMI by 0.13 kg/m² (95% CI: –0.21 to 0.46) at intervention sites ($p = 0.36$) • improvement in stairwell usage • promotion of walking and use of pedometers • workplace-level changes encountered some resistance and were not fully implemented

proved purchasing behavior in line with the initial agreements for fruits and vegetables and more frequent use of healthy cooking methods. In addition, meals were eaten less frequently in front of the television. The increase in daily consumption of fruits and vegetables by 0.5 servings (baseline to month 4) was not statistically significant compared to the control households ($p < 0.17$). However, the percentage of fat intake could still be statistically significantly reduced in comparison ($p < 0.03$).

Discussion

Interventions from the nudging taxonomy in the process-oriented context of nutrition therapy (e.g., German-Nutrition Care Process [G-NCP]) represent a new approach to date. Consequently, scientific engagement with this topic is indispensable. Behavioral modification is a continuous feature in the therapy of obesity in all available guidelines [19, 23–25, 38] and is even regarded as the only causal therapy at the individual level in rehabilitation [39]. The targeted use of low-threshold (and cost-effective) nudging interventions, which accompany individuals on their therapeutic journey, could be highly beneficial in the treatment of overweight and obesity, especially given the medical [5], economic [40], and personal significance [3, 4] of this condition. This work aimed to determine the extent of previous uses of nudging among adults with overweight or obesity.

The results of this study show that nudging was employed in individuals with obesity across various settings and approaches. The interventions yielded mixed results regarding their effectiveness in reducing body weight and promoting healthy eating habits (• Table 4) [30–37]. The studies that utilized nudging interventions exhibited great variability in study design, populations, and the interventions themselves. Most interventions were a combination of different approaches (nudging + non-nudging) [31–35]. This complicates the attribution of a causal relationship, as well as direct comparability of the studies, and affects the interpretation of the results. Another limiting factor is the heterogeneity of the study populations across the individual studies, which restricts the generalizability of the findings.

Several studies demonstrated differences between the intervention and control groups with respect to body weight development and improvements in dietary aspects [30, 32, 33]. This suggests that the effectiveness of nudging interventions can strongly depend on various factors, such as the type of intervention, the setting, and the individual characteristics of the participants. Most of the included studies reported short-term results. Long-term effects of nudging interventions were investigated only to a limited extent [31, 33]. Therefore, whether the observed effects persist or diminish in the long term remains unclear, indicating a need for further studies with longer follow-up periods.

Despite the mixed outcomes, this investigation suggests that nudging interventions can contribute to obesity therapy, particularly if they are used as part of a more comprehensive treatment approach. It is important to consider the ethical implications of nudging interventions, especially regarding the autonomy and self-determination of the participants. In contrast to the use of nudging at, for example, the population level, nudging interventions in a therapeutic context should be tailored to individuals and, if necessary, coordinated or negotiated with potential target persons (participation). The latter could, in any case, be induced because quite a few nudging interventions, when applied, concern one's own personal/private environment.

Limitations of this review include the potential restriction with regard to the completeness of the included studies due to less stringent conditions, as well as the fact that the literature search was carried out by only one person, unlike in a conventional scoping review. In this scoping review, a global assessment of the evidence level of the study designs used according to Cook et al. was employed, but no detailed quality assessment was performed, as all included studies featured heterogeneous study designs [30–37]. In addition, intervention studies without blinding were included in this review, since blinding is not always possible in nudging interventions and there were overall very few original studies on the topic. However, a strength of this study was the systematic a priori approach, the extensive literature search, and the use of various databases.

Conclusion

The results of this study suggest that nudging can be considered as a complementary approach within a comprehensive therapeutic strategy for obesity. By creating subtle changes in the decision-making environment, nudging interventions could lead to health-promoting dietary habits and to a reduction in body weight. However, it is important to note that the effectiveness of nudging interventions depends on various factors and that further research is needed to identify the specific mechanisms and conditions under which nudging can be effectively applied in nutrition therapy. Future studies should aim to determine the exact mechanisms and conditions under which nudging interventions are most effective. It is also crucial to investigate the long-term effects and sustainability of these interventions. For this purpose, high-quality studies are required in order to quantitatively assess the effectiveness of nudging and to examine the transferability of the findings to different populations and settings.

Disclosures on Conflicts of Interest and the use of AI
Robert Renter is professionally employed by Sidekick Health Germany GmbH. This affiliation had no influence on the study design or the content of this article. The article was written as part of a master thesis at the Neubrandenburg University of Applied Sciences. All authors declare that there is no conflict of interest. AI-based applications for language optimization and translation were used in the preparation of the manuscript.

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