Received: 27 April 2021 | Revised: 1 June 2021 | Accepted: 2 June 2021

DOI: 10.1111/ijcs.12723

ORIGINAL ARTICLE

International Journal of Consumer Studies WILEY

# Some like it tailor-made: The effectiveness of personalized coupons for lower-calorie food choices at a university canteen

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**Funding information**
Bundesministerium für Bildung und Forschung

## Abstract

As an emerging marketing tool that targets shoppers individually based on their purchase histories, personalized price promotion is likely to address the limitations of untargeted price reductions. However, there is no prior evidence to support the effectiveness of this approach in promoting low-calorie food choices, and which consumer-specific characteristics influence its performance. In this study, we analyze the effectiveness of personalized and non-personalized coupons for lower-calorie menus at a university canteen. In addition, we examine the interaction between psychological factors and promotional responses, as well as subsequent dietary outcomes. Overall, personalized price promotion performs better than the untargeted approach in encouraging shoppers to redeem the offered coupons and make menu choices with more healthy items and fewer calories. Factors such as calorie concerns, convenience orientation, and the resistance to change eating habits have significant effects on coupon redemption. The role of coupon redemption in mediating the association between such psychological predictors and dietary changes proves the effectiveness of price reductions. This study highlights the potential of personalized price promotion as a healthy eating intervention and sets the groundwork for developing and evaluating this instrument.

**KEYWORDS**

food away from home, healthy eating intervention, lower-calorie food, personalized price promotion, price reduction

## 1 | INTRODUCTION

Obesity has long been a public health concern, and prior research points to excessive energy intake as a major contributor to this epidemic (Loring & Robertson, 2014). Given the increasing supply and decreasing prices of foods high in calories, many consumers are replacing nutritious and low-calorie foods with energy-dense alternatives to ensure their calorie intake at an affordable cost (Loring & Robertson, 2014). This change puts this group of consumers at greater risk of obesity and diet-related chronic diseases (Darmon & Drewnowski, 2008). Another factor often cited as a driver of obesity is the increasing consumption of food away from home (FAFH) (Mancino et al., 2009). As a result, reducing the price of healthy FAFH is an effective instrument in addressing obesity (French, 2003; World Health Organization, 2015).

By design, price interventions on the food market are developed under the assumption that all consumers benefit from the reduced

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price of healthy foods, without considering individual differences in promotion responsiveness (Just & Gabrielyan, 2016; Steenhuis et al., 2011). While consumers who already have healthy diets are more responsive to discounts on nutritious foods, reductions in the price of fruit and vegetables are less likely to bring about improvements in the diet quality of the population at risk (Darmon et al., 2016; Muller et al., 2017). This implies the need for more tailor-made strategies to tackle the limitations of untargeted price reductions. To our knowledge, no study currently exists that explores the possibility of personalizing price interventions with respect to healthy food choices, despite the increasing application of individualization in other areas of healthy eating promotion, such as personalized nutrition or tailored education programs (Brug et al., 2003).

In practice, the concept of personalized price promotion (PPP) has been put to work thanks to advances in data analytics (Shaffer & Zhang, 2002). Grocery chains are now able to target promotional offers at individual customers based on their purchase histories (Venkatesan & Farris, 2012). Nguyen et al. (2019) synthesize evidence on food-related PPP and find this approach to be more effective than untargeted promotions in inducing more choices of targeted products and improving the economic benefits of food stores or brands. Table 1 summarizes the key elements of studies presented in Nguyen et al. (2019) and indicates the literature gaps relevant to PPP for food products. Overall, the available research is limited to examining how PPP influences the immediate buying decisions of consumers and the performance of brands or stores, thus overlooking the dietary effects of this strategy. Since all studies estimate the effects of PPP at grocery stores, it remains unclear how this approach performs in the FAFH setting. Most previous studies have also investigated factors influencing the effectiveness of PPP. However, they have focused strongly on product and promotion-specific variables such as discount level (Terui & Dahana, 2006), targeting strategy (Baik, 2015), timing strategy (Johnson et al., 2013; Zhang & Krishnamurthi, 2004), and data source (Niraj & Siddarth, 2014). The research by Zhang and Wedel (2009) is the only study that takes consumer-specific characteristics (e.g., promotion sensitivity) into consideration.

The discussion above implies that PPP has the potential to tackle unsolved problems related to healthy eating interventions and emphasizes the need for research into overlooked topics related to this emerging marketing tool. Hence, this study aims to examine whether PPP is more effective than untargeted price reductions in encouraging lower-calorie menu choices at a university canteen. Another objective of this study is to investigate how individual differences in orientations toward food and nutrition affect consumer responses to price promotions. Thus, this study identifies the elements subject to modification and helps fine-tune future personalization strategies to address the heterogeneity of consumers based on their psychological traits (Neslin et al., 1994). For this reason, our study concentrates on the interplay between such psychological factors and promotional responses, as well as subsequent dietary changes among recipients of both personalized and non-personalized discounts.

## 2 | HYPOTHESES

Given its particular strategy of targeting customers individually, food-related PPP has major advantages over the untargeted approaches. Food preferences are relatively well defined and consumers can easily judge whether a promotional offer fits their preferences (Simonson, 2005). Therefore, consumers tend to evaluate a special offer positively if it matches their purchasing patterns. Furthermore, the PPP strategy allows marketers to determine existing customers and reward them with incentives for what they usually buy (Osuna et al., 2016). This strategy enhances customer satisfaction and improves promotion responsiveness (Venkatesan & Farris, 2012). Consumers tend to favor exclusive promotional offers, such as personalized coupons, owing not only to the monetary savings but also the exclusivity of the deals (Drèze & Nunes, 2009; Venkatesan & Farris, 2012). These factors result in a greater likelihood that exclusive offers will be redeemed (Feinberg et al., 2002). Indeed, Nguyen et al. (2019) find that PPP for food products generates a higher rate of coupon redemption and purchase incidence compared to non-personalized promotions. This research evidence leads to our first hypothesis.

**Hypothesis 1** *Personalized coupons for lower-calorie foods lead to higher redemption rates than non-personalized coupons.*

Previous research indicates a larger effect of food-related PPP than its untargeted counterparts in inducing consumers to switch to and buy more of a promoted product (Khan et al., 2009; Venkatesan & Farris, 2012; Zhang & Breugelmans, 2012). According to Nguyen et al. (2019), such adjustments result in changes in food consumption patterns. Purchase acceleration and repeated purchase increase the inventories of discounted items and stimulate consumption of such stockpiled products (Chandon & Wansink, 2002). Meanwhile, switching between food alternatives with different dietary values creates changes in the nutrient intake of consumers (Hawkes, 2009). From this standpoint, we speculate that the greater likelihood of behavioral change after PPP brings about more dietary differences than when untargeted strategies are in place. As a result, the following hypothesis is tested in this study.

**Hypothesis 2** *Personalized coupons for lower-calorie foods lead to more changes in menu and calorie selection than their non-personalized counterparts.*

Given the trend of FAFH, convenience is becoming a vital driver in food choice (Conner, 1993). Several studies find convenience orientation to correlate strongly with energy-dense diets, thus exhibiting a negative relationship with healthy eating patterns (Delley & Brunner, 2019; Ulijaszek, 2007). Since convenience orientation constitutes the tendency to prefer comfort in consumption, this trait predicts the use of heuristics to reduce the cognitive efforts in decision making (DelVecchio, 2005; Mandrik, 1996). Shoppers are more responsive to external cues in their surroundings when they are not under cognitive

**TABLE 1** Overview of literature on food-related PPP

| | | Examined variables | | | | |
|---|---|---|---|---|---|---|
| | | Effects of PPP on… | | | Determinants of PPP effectiveness | |
| Author (Year) | Setting | Purchase behavior | Economic performance | Food consumption | Product and promotion-specific | Consumer-specific |
| Zhang and Krishnamurthi (2004) | Grocery store | Purchase incidence and acceleration | Brand sales and profit | | Promotion timing | |
| Terui and Dahana (2006) | Grocery store | | Brand sales and profit | | Discount level | |
| Khan et al. (2009) | Grocery store | Purchase incidence and acceleration | Store sales and profit | | Promotion type and regularity | |
| Zhang and Wedel (2009) | Grocery store | | Store profit | | Promotion strategy | Promotion sensitivity |
| Venkatesan and Farris (2012) | Grocery store | Coupon redemption, purchase acceleration, etc. | Store sales | | Promotion regularity | |
| Zhang and Breugelmans (2012) | Grocery store | Store visit, purchase acceleration | Store sales, customer retention, and acquisition | | | |
| Johnson et al. (2013) | Grocery store | | Brand profit | | Promotion timing, brand characteristics | |
| Niraj and Siddarth (2014) | Grocery store | | Brand and store profit | | Within-chain versus cross-chain data source | |
| Baik (2015) | Grocery store | Coupon redemption, store visit | Store sales and profit | | Promotion strategy | |
| Osuna et al. (2016) | Grocery store | Coupon redemption | Brand sales | | Promotion strategy, category, and brand characteristics | |
| Present study | University canteen | Coupon redemption | | Menu and calorie selection | | Nutritional perceptions |

load, and discounts are likely to be more effective under such circumstances (Carroll et al., 2018). In consequence, we expect that discount coupons for lower-calorie menus play a substantial role in mediating the negative effects of convenience orientation on changes toward making a lower-calorie choice. In other words, we hypothesize that:

**Hypothesis 3a** *Convenience orientation correlates positively with coupon redemption after the intervention.*

**Hypothesis 3b** *Convenience orientation positively affects post-intervention dietary changes through the mediating role of coupon redemption.*

Since this study focuses on lower-calorie foods, it is crucial to take the calorie concern and knowledge of participants into account. Prior evidence shows that consumer knowledge about calories strongly influences decisions related to FAFH (Carrillo et al., 2012; Sun et al., 2010). Upon exposure to calorie information, consumers tend to select items or menus containing less energy (Larson et al., 2018; Roberto et al., 2010). Findings by Oakes and Slotterback (2002) and Wardle et al. (2000) further reveal that weight and calorie-conscious consumers are more likely to reduce their energy consumption and increase their intake of fruit and vegetables. Consumers with such patterns also exhibit greater responsiveness to price reductions on healthy foods (Muller et al., 2017). This leads to the following hypotheses on the interplay between calorie concern, coupon redemption, and dietary changes.

**Hypothesis 4a** *Calorie concern correlates positively with coupon redemption after the intervention.*

**Hypothesis 4b** *Calorie concern positively affects post-intervention dietary changes through the mediating role of coupon redemption.*

Food choice is strongly influenced by consumer perception of quality traits (Conner, 1993; Rozin et al., 2004). According to the Total Food Quality model of Grunert et al. (1996), food quality is characterized by not only sensory traits (e.g., taste) but also health, convenience, and process-oriented dimensions (e.g., local or organic production). While taste and convenience act more as barriers when it comes to healthy eating (Deshpande et al., 2009), perceptions of food healthfulness encourage healthy choices of FAFH (Filimonau et al., 2018). From the perspective of consumers, organic and local foods are perceived as healthier, fresher, and less energy-dense than conventional alternatives (Schifferstein & Oude Ophuis, 1998). Buyers of such products have lower Body Mass Index (BMI) and exhibit healthier consumption patterns both at home and away from home (Cavaliere et al., 2014; Lu & Gursoy, 2017; Schifferstein & Oude Ophuis, 1998). In the present study, quality preference constitutes the propensity for considering health and process-oriented attributes in food selection and is expected to induce consumers to make favorable dietary changes. Nevertheless, inference about food quality are negatively related to promotion responsiveness (Cohen & Babey, 2012). Consumers who tend to assume that a higher price is associated with higher quality usually undermine the value of discounted products and show greater reluctance in responding to price promotions (Palazon & Delgado-Ballester, 2009). It is plausible to assume that a quality-oriented consumer is not likely to redeem a coupon even though it targets healthier foods. Hence, our hypotheses regarding the interaction involving quality concerns, coupon redemption, and subsequent dietary changes are as follows:

**Hypothesis 5a** *Quality preference correlates negatively with coupon redemption after the intervention.*

**Hypothesis 5b** *Quality preference negatively affects post-intervention dietary changes through the mediating role of coupon redemption.*

Asp (1999) postulates that barriers to healthy eating are vital factors influencing food decisions of individual consumers. Such barriers result from the resistance to change existing habits and lack of motivation to adopt a new dietary behavior. Lack of motivation stems primarily from negative beliefs such as the "healthy is expensive" intuition, which infers that the costs of healthy choices outweigh their benefits (Haws et al., 2017). Unmotivated consumers also exhibit low-value beliefs (e.g., the importance of a healthy diet is not sufficient enough to make it worth pursuing) and a lack of effort beliefs (e.g., it requires a lot of effort to eat healthily) (Hardcastle et al., 2015). Meanwhile, food selection and consumption are habitual activities that take a long time to form and are difficult to change (Orbell & Verplanken, 2010). This results in a substantial level of resistance among consumers. Nearly 60% of European consumers were unwilling to compromise on taste to aim for the healthfulness of food (Brug, 2008). In Germany, 16% of respondents stated no intention to change or try a healthier diet while 22% considered the cost of giving up on favorite foods as a major barrier to healthy eating (Kearney & McElhone, 1999). Derived from previous research, our assumptions about the relationship between coupon redemption, dietary changes, and the mentioned cognitive barriers are the following:

**Hypothesis 6a** *Negative beliefs about healthy eating correlate negatively with coupon redemption after the intervention.*

**Hypothesis 6b** *Negative beliefs about healthy eating negatively affect post-intervention dietary changes through the mediating role of coupon redemption.*

**Hypothesis 7a** *Resistance to change eating habits correlates negatively with coupon redemption after the intervention.*

**Hypothesis 7b** *Resistance to change eating habits negatively affects post-intervention dietary changes through the mediating role of coupon redemption.*

## 3 | METHODS

### 3.1 | Experimental design

Using personalized and non-personalized discount coupons, we carried out a quasi-natural experiment to promote menu choices

containing fewer calories than the original alternatives. This study took place at a university canteen in southern Germany in 2017. An ethical approval for this study was issued by the university's Ethics Commission in November 2017. The study participants were conveniently recruited from canteen patrons, most of whom were students and employees at the campus.

The experiment was conducted using server-based software to enable ordering with mobile devices. First, all subjects filled out a questionnaire about their gender, job-related and free-time activities, and their tendency to buy products that are on sale. They next chose a menu from items listed at the canteen. All menus consisted of a main dish, side dish, dessert, and drink. Once they had selected their menus, we offered participants various discount coupons targeting menu alternatives with lower calorie content. Participants had the option of redeeming the coupons they had been given, or staying with their initial choices, and they paid the cashier for their items. All subjects had to complete another questionnaire about their sociodemographic and psychological characteristics after the meal. After handing in this questionnaire, each person earned €8 and a discount equal to the value of the coupon they had redeemed.

In this experiment, the canteen's technical infrastructure did not allow us to determine participants' deal proneness based on their ordering histories, as suggested by Kukar-Kinney and Xia (2017). Therefore, we measured deal proneness based on Likert-type scale items presented in Lichtenstein et al. (1993). Factors related to food and nutrition were constructed out of psychological items from different scales (see Appendix B). To determine consumers' convenience orientation, we used statements about preferences for convenience (Scholderer et al., 2004), time and energy saving when eating or preparing meals (Candel, 2001). Calorie concern was estimated using dieting behaviors and nutritional knowledge constructs from Lundholm and Wolins (1987) and Gracey et al. (1996), respectively. Aspects of quality preference were defined based on the Total Food Quality Model (Grunert et al., 1996) and corresponding attitudinal items from Scholderer et al. (2004). Negative beliefs about healthy eating consisted of nutrition-related beliefs items developed by Gracey et al. (1996) and O'Connell et al. (1981). The resistance to change eating habits was measured with one item ("I dislike everything that might change my eating habits"). All items were assessed on six-point Likert-type scales ranging from 1 (very untrue for me) to 6 (very true for me). This scale was used since it is more reliable and exhibits a higher trend for discrimination than a five-point scale (Leung, 2011; Rungson, 2010).

## 3.2 | Menu design and calorie estimation

Appendix A presents the list of menu items on the day of the experiment. Participants had a total of 176 menu options based on two main dishes, four side dishes, two desserts, and 11 drinks. Based on recipes provided by the canteen, we estimated the calorie content of main dishes, side dishes, and desserts using the PRODI® application. The nutritional values of foods in this application were derived from Germany's Federal Food Code database (Kluthe, 2012; Poschwatta-Rupp, 2016). The calorie content of drinks was based on their labeled nutritional facts. The dishes with the lowest calorie content in each category were considered healthy or low-calorie items (e.g., vegetable curry as a main dish, mixed salad as a side dish, fruit salad as a dessert, and mineral water as a drink).

Following the menu selection, the experiment software automatically generated the total calories selected by each subject and compared these with guidelines for energy intake issued by the German Nutrition Society (2015). First, we used information on free-time and job-related activities gathered in the questionnaire to identify the subject's Physical Activity Level (PAL). Second, we determined the recommended calorie intake per meal for each individual based on their gender and PAL value (German Nutrition Society, 2015). Since recommendations by the German Nutrition Society (2015) were given on a daily level, we assumed that lunch accounted for 30% of the daily energy intake (Huseinovic et al., 2016; Schwedhelm et al., 2019) and estimated the individual guide values accordingly.

## 3.3 | Intervention

Study participants ($n = 165$) were randomly assigned to a treatment or control group. Subjects in the control group ($n = 96$) obtained identical coupons for a 50% discount on a menu consisting of four low-calorie items. Participants in the treatment group ($n = 69$) had a selection of up to three personalized coupons, depending on their original menu selection. As shown in Figure 1, the aim of coupon personalization is to encourage participants to switch to a menu with more healthy items and fewer calories than their initial choices. For instance, we provided an individual choosing a menu with two low-calorie items with different coupons: one for the four-low-calorie-item menu and one for a random menu with three low-calorie items.

The personalized coupons differed in terms of not only the targeted menus but also the discounts, which ranged from 10% to 50%. Menus with more low-calorie items were discounted at a higher level. We also determined the amount of discount for each coupon based on an individual's deal proneness and calorie selection. Participants who chose more calories than their recommended energy intake received higher discounts than those who selected an appropriate amount of calories. This intervention was in line with suggestions from Nordström and Thunström (2015) on giving larger compensations to consumers with poor dietary intake. Likewise, subjects less prone to redeem the coupons were provided with higher discounts since they needed more attractive incentives to respond to promotions than deal-prone consumers did (DelVecchio, 2005).

Apart from cross-selling coupons to motivate the selection of lower-calorie alternatives, we provided participants with reward coupons based on their selections. Reward coupons were offered when a subject's original choice contained three or more low-calorie items and whose calorie content met the recommendations for energy intake.

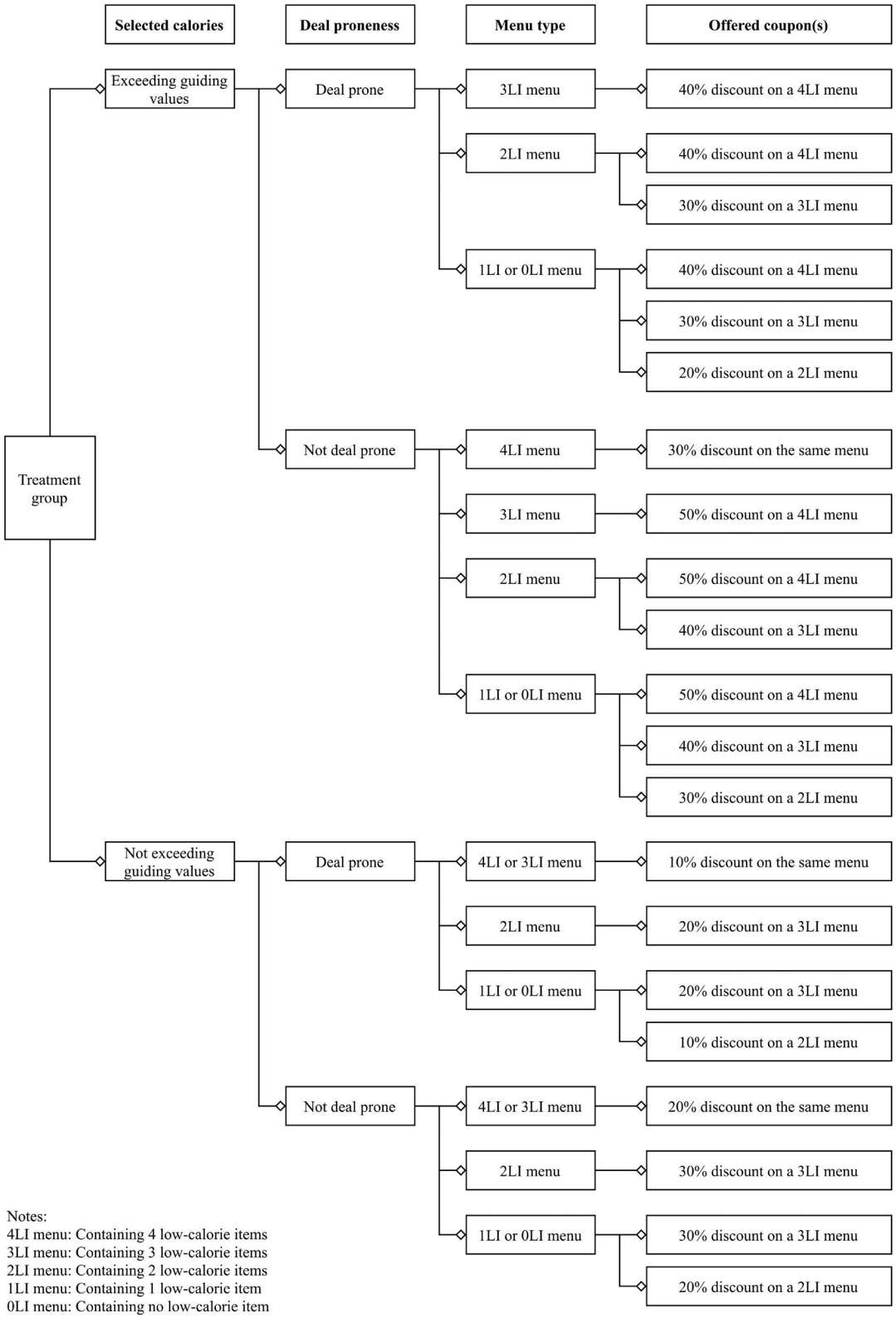


**FIGURE 1** Coupon personalization based on calorie need, deal proneness, and menu choices

### 3.4 | Statistical analysis

We examined the effects of personalized and non-personalized coupons in terms of coupon redemption decisions, as well as changes in menu and calorie selection. The Pearson's Chi-square test was applied to categorical variables and the Mann–Whitney U test to continuous variables. In accordance with Cohen (1988), we quantified the between-group differences to measure the magnitude

of treatment effects. For dichotomous variables, we computed Cramer's V statistics while rank biserial *r* was used for continuous variables. To interpret the effect-size measures, we followed additional guidelines from Fritz et al. (2012).

We performed a Structural Equation Modeling (SEM) procedure to investigate the effects of psychological characteristics on the treatment effectiveness using the lavaan package in R (Rosseel, 2012). We used the DWLS (Diagonally Weighted Least Squares) estimator for factor extraction, since this method makes no assumption of multivariate normality and performs better than Maximum Likelihood (ML) for ordinal data (Li, 2016; Mîndrilă, 2010). Prior to the extraction, we examined the data suitability for factor analysis using the Bartlett's test of sphericity and the Kaiser–Meyer–Olkin (KMO) measure. To examine the validity of latent constructs, we computed the average variance extracted (AVE) and composite reliability (CR) measures. According to Fornell and Larcker (1981), the acceptable values for CR and AVE are 0.7 and 0.5, respectively. The final model's goodness-of-fit was assessed based on the Chi-square fit statistic and indices such as Comparative Fit Index (CFI), Tucker-Lewis-Index (TLI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA) (Tabachnick & Fidell, 2013).

To ensure the measurements are equivalent between the control and treatment groups, we constrained model parameters and tested the establishment of measurement invariance at various levels (Millsap, 2011). First, we held all factor loadings constant between the two groups for metric invariance testing. The second model was nested under the first model and additionally required intercepts to be equal across groups to establish scalar invariance. Third, we included constraints on residual variances to examine strict invariance. These constrained models were compared with a configural model using Chi-square difference tests. Parameters of the configural model were estimated freely across groups. An insignificant difference between the configural model and a constrained model indicates the establishment of invariance at the corresponding level (Vandenberg & Lance, 2000). If the measurements are invariant across groups, a single-group model is sufficient. Otherwise, a multi-group model is used to demonstrate the between-group distinctions (Hensher & Stopher, 1979).

Afterward, we extended the model to specify the pattern of relationships between coupon redemption, dietary changes, and psychological characteristics. To take the influence of coupon type into consideration, we included an exogenous variable indicating whether the redeemed coupon was personalized or not. Dietary changes were measured by differences in the number of selected calories and healthy items between a subject's initial and final menu choices. The calorie-related indicator was divided by 1,000 to ensure scale consistency between two variables. The causal relationship between psychological traits and coupon redemption was examined to test hypotheses $H_{3a\text{-}7a}$. We additionally measured the effects of these psychological predictors (causal variables) on dietary changes (outcome variable) through the mediating role of coupon redemption ($H_{3b\text{-}7b}$). The indirect effect of a specific psychological variable was estimated by multiplying the point estimate of the causal path between this variable and the mediator with the impact of the mediator on the outcome variable (Shrout & Bolger, 2002).

We assessed the nature of mediation based on the typology presented in Zhao et al. (2010). If an indirect effect exists and there is no direct effect, the path from a causal variable to the outcome is completely mediated by the mediator (indirect-only mediation). Complementary mediation occurs when the direct and indirect not only exist but also point to the same direction. Another case is competitive mediation, in which the direct effect has the opposite sign to the indirect effect, which is the product of paths from the predictor to the mediator and from the mediator to the outcome. When there is no indirect effect, the pattern is categorized as either no-effect non-mediation or direct-only non-mediation, depending on the presence of the direct effect. To test the significance of indirect paths, we bootstrapped the results by repeatedly sampling from the data set with replacement and computing the indirect effect in each resampled set (Preacher & Hayes, 2008). The confidence interval (CI) at the 95% level was obtained for each causal variable based on 5,000 iterations of resampling (see Table 6). An interval without the null value indicates the corresponding indirect effect is significantly different from zero (Preacher & Hayes, 2008).

## 4 | RESULTS

### 4.1 | Participants and interventions

Table 2 demonstrates the sociodemographic and lifestyle-related characteristics of the study participants. The final sample consisted of 165 adults (43.64% were female). The average age of this sample was 30.58 ($SD$ = 11.61) and the average household size was 1.93 ($SD$ = 1.17). Around one-third of participants earned less than €900 per month, and the majority (63.64%) had an academic degree. The sample's average BMI was 23.74 ($SD$ = 3.29), with more than half of the participants leading a moderately active physical lifestyle (PAL 1.6) and 27.88% being overweight or obese. Among the participants, a small proportion was vegetarian or vegan (7.88%) or followed a special diet at the time of the experiment (4.85%). According to Chi-square and Mann–Whitney U tests, there was no statistically significant distinction between members of the control and treatment groups ($p > .05$).

Table 3 presents the significant differences between the two intervention types. In alignment with the intervention strategy, each subject in the control group received an identical coupon, whereas a total of 154 coupons were distributed to the treatment group. This resulted in an average of 2.23 coupons ($SD$ = 0.83) delivered to each treatment group member. Unlike the control intervention, most personalized coupons (64.94%) encouraged participants to choose a menu with two or three low-calorie items. Coupons with discounts between 20% and 40% accounted for approximately 80% of the personalized deals. A small proportion was offered at the highest

**TABLE 2** Participant characteristics and tests of group differences

| | Overall $n = 165$ | Control $n = 96$ | Personalized $n = 69$ | $p$-value |
|---|---|---|---|---|
| Female, % | 43.64 | 40.62 | 47.83 | .447 |
| Age ± *SD* | 30.58 ± 11.61 | 31.53 ± 11.96 | 29.25 ± 11.05 | .213 |
| Household size ± *SD* | 1.93 ± 1.17 | 1.92 ± 1.19 | 1.96 ± 1.14 | .830 |
| Education level, % | | | | .693 |
| Secondary school with apprenticeship | 1.82 | 1.04 | 2.90 | |
| High school or equivalent | 4.24 | 4.17 | 4.35 | |
| High school with university entrance qualification | 30.3 | 28.12 | 33.33 | |
| Academic degree (Bachelor's, Master's) | 63.64 | 66.67 | 59.42 | |
| Net monthly income, % | | | | .853 |
| Under 900 Euro | 32.12 | 32.29 | 31.88 | |
| 900 to under 1,500 Euro | 12.12 | 11.46 | 13.04 | |
| 1,500 to under 2,600 Euro | 21.82 | 21.87 | 21.74 | |
| 2,600 to under 3,600 Euro | 13.94 | 12.50 | 15.94 | |
| 3,600 to under 5,000 Euro | 14.55 | 16.67 | 11.60 | |
| More than 5,000 Euro | 5.45 | 5.21 | 5.80 | |
| BMI ± *SD* | 23.74 ± 3.29 | 24.10 ± 3.46 | 23.24 ± 3.00 | .097 |
| Overweight, including obese, % | 27.88 | 32.29 | 21.74 | .188 |
| Physical activity level (PAL), % | | | | .533 |
| PAL 1.4 | 22.42 | 21.88 | 23.19 | |
| PAL 1.6 | 54.55 | 52.08 | 57.97 | |
| PAL 1.8 | 19.39 | 22.92 | 14.49 | |
| PAL 2.0 | 3.03 | 2.08 | 4.35 | |
| PAL 2.2 | 0.61 | 1.04 | 0.00 | |
| Following a diet, % | 4.85 | 4.17 | 5.8 | .910 |
| Being vegan or vegetarian, % | 7.88 | 11.46 | 2.9 | .085 |

discount level of 50% (12.34%). The percentage of subjects getting a reward coupon for the low-calorie menus they initially selected was higher in the treatment (15.94%) than in the control group (3.12%).

## 4.2 | Treatment effects

Table 4 illustrates intervention effects on coupon redemption, food choice, and calorie selection across interventions. Personalized coupons had a much higher redemption rate (76.81%) than the non-personalized counterparts (26.04%). This difference was statistically significant ($p < .001$) and consistent with our first hypothesis. The Cramer's V statistic of 0.5 indicated a large effect size. Contrary to the control intervention, personalized coupons were redeemed at various discount levels, with 30% discount coupons having the highest redemption rate (20.29%).

Prior to the intervention, the number of low-calorie items in the menus initially selected was comparable over two treatments ($p > .05$), and both groups exhibited increases in post-intervention measures. However, the change among subjects obtaining personalized coupons was larger. This resulted in the significantly higher number of low-calorie items selected per menu after the personalized intervention (2.70, $SD = 1.08$), compared to the control group (2.11, $SD = 1.49$, $p < .01$). Although both interventions led to a significant rise in the percentage of four-low-calorie-item menus, there was a prominent distinction in the proportion of other menu types. Whereas non-personalized coupons hardly affected the choice of menus with one or no low-calorie item, the percentage of such menus dropped tremendously from 50.72% to 13.04% after the personalized treatment. In addition, it was clear that more choices with three low-calorie items were made in the treatment group, whereas this number declined slightly in the control group. Such changes resulted in a significant discrepancy in the post-intervention breakdown of different menu types between the two groups ($p < .001$, $V = 0.4$), given that there was no significant difference before the intervention ($p > .05$).

Concerning menu item selection, the interventions had no differential effect on drink choices ($p > .05$). Nevertheless, personalized coupons induced a considerably higher number of subjects to switch to a healthier main dish ($p < .01$), side dish, and dessert ($p < .05$), compared to non-personalized counterparts. Since these items contributed greatly to the total number of menu calories, such alterations resulted in a tremendous distinction in the final selected calories between the control (892.55, $SD = 509.75$) and treatment

**TABLE 3** Characteristics of the coupons offered and tests of group differences

| | Overall $n = 250$ | Control $n = 96$ | Personalized $n = 154$ | $p$-value |
|---|---|---|---|---|
| Discounted menu types, % | | | | .000 |
| Two low-calorie items | 14.00 | 0.00 | 22.73 | |
| Three low-calorie items | 26.00 | 0.00 | 42.21 | |
| Four low-calorie items | 60.00 | 100.00 | 35.06 | |
| Discount levels of offered coupons, % | | | | |
| 10% discount | 4.40 | 0.00 | 7.14 | .000 |
| 20% discount | 9.60 | 0.00 | 15.58 | |
| 30% discount | 19.60 | 0.00 | 31.82 | |
| 40% discount | 20.40 | 0.00 | 33.12 | |
| 50% discount | 46.00 | 100.00 | 12.34 | |
| Reward coupon, % | 8.48 | 3.12 | 15.94 | .009 |

group (669.67, $SD = 354.46$, $p < .01$). Although both interventions led to decreases in the selected calories, the absolute and percentage change in calorie selection in the personalized group were significantly larger than in the control group ($p < .01$). Furthermore, the rank biserial $r$ of 0.3 indicated a moderate treatment effect on calorie reduction. This outcome supports our second hypothesis that personalized coupons lead to more favorable dietary changes than non-personalized coupons.

### 4.3 | Effects of psychological factors

Appendix B demonstrates the results of the pre-extraction analysis for SEM. The average KMO measure of 0.66 implied sample adequacy and Bartlett's test of sphericity revealed that the correlation matrix between observed variables differed significantly from an identity matrix ($p < .001$). The AVE and CR values of all extracted constructs met the thresholds of 0.5 and 0.7, respectively. Table 5 presents the results of the invariance tests in which equality constraints were introduced to the model parameters. Differences in TLI and SRMR indices were marginal across models. The insignificance of all Chi-square tests confirmed the invariance establishment in the metric, scalar, and strict levels ($p > .05$). Hence, no multi-group solution was required. The final model additionally revealed a good fit to the data with $\chi^2 = 118.03$ ($p > .05$), CFI = 0.98, TLI = 0.98, SRMR = 0.07, and RMSEA = 0.03.

Figure 2 also illustrates the causal relationships between independent variables and coupon redemption decisions, as well as subsequent dietary changes. The likelihood of coupon redemption was associated positively with dietary changes ($b = 1.13$, $p < .001$). Coupon redemption also correlated positively with personalized coupon ($a_1 = 0.56$, $p < .001$), convenience orientation ($a_2 = 0.29$, $p < .01$) and calorie concern ($a_3 = 0.23$, $p < .01$) while being negatively affected by resistance to change ($a_6 = -0.38$, $p < .001$). These findings were in line with our assumptions in $H_{3a}$, $H_{4a}$, and $H_{7a}$. Hypotheses $H_{5a}$ and $H_{6a}$ were not supported since the model revealed no significant impact of quality preference and negative beliefs on coupon redemption ($p > .05$). While none of the psychological variables exhibited a significant direct effect on dietary changes ($p > .05$), personalized coupon had a negative impact on this outcome variable ($c_1 = -0.36$, $p < .05$). In other words, personalized coupons led to a lower level of dietary changes than non-personalized coupons when the effect of coupon redemption was held constant.

Table 6 demonstrates the bootstrap results of the mediated effects and summarizes the mediation type related to each independent variable. The indirect effects of personalized coupon were statistically significant ($a_1b = 0.63$, 95% CI [0.40, 0.86]) and pointed to the opposite direction with its direct effect, implying a competitive mediation pattern. The indirect effects of convenience orientation, calorie concern and resistance to change were also significant, with none of the corresponding bootstrap 95% CIs including zero. This indicated the case of indirect-only mediation. Through the mediation of coupon redemption, convenience orientation and calorie concern affected dietary changes positively ($a_2b = 0.33$, $a_3b = 0.26$) as proposed by hypotheses $H_{3b}$ and $H_{4b}$. The negative indirect effects of resistance to change on the outcome variable were also consistent with our assumptions in $H_{7b}$ ($a_6b = -0.43$). In terms of quality preference and negative beliefs about healthy eating, no mediation effect was found. Hence, hypotheses $H_{5b}$ and $H_{6b}$ were not supported by the model's output.

## 5 | DISCUSSION

### 5.1 | Consideration of findings

This quasi-natural experiment delivers initial empirical insights into the effectiveness of personalized coupons in promoting lower-calorie food choices and reducing energy intake in relation to the non-personalized strategy. The findings reveal both interventions to motivate redeeming offered coupons, switching to menus with more low-calorie items and decreasing selected calories. This outcome is consistent with previous research on the effectiveness of price reductions at restaurants, school cafeterias, vending machines, and other FAFH settings (An et al., 2013; French, 2003; French et al., 2001; Nordström & Thunström, 2015).

Given positive changes in both intervention groups, the personalized treatment exhibits a considerably larger effect on coupon and menu choices. This result is supported by findings by Khan et al. (2009), Venkatesan and Farris (2012), and Zhang and Breugelmans (2012). These studies show that PPP performs better than non-personalized approaches in inducing coupon redemption and the subsequent behavior of product switching. To some extent, the higher redemption rate of PPP is explained by the greater

**TABLE 4** Treatment effects on coupon redemption, food choice, and calorie reduction

| | Control $n = 96$ | Personalized $n = 69$ | $p$-value | Effect size |
|---|---|---|---|---|
| Coupon redemption rate, % | 26.04 | 76.81 | .000 | 0.5[a] |
| Redemption rate by coupon type, % | | | | |
| 10% discount | 0.00 | 15.94 | .000 | |
| 20% discount | 0.00 | 14.49 | .000 | |
| 30% discount | 0.00 | 20.29 | .000 | |
| 40% discount | 0.00 | 14.49 | .000 | |
| 50% discount | 26.04 | 11.60 | .037 | |
| Number of low-calorie items in selected menus ± *SD* | | | | |
| Before intervention | 1.49 ± 1.05 | 1.55 ± 1.05 | .712 | |
| After intervention | 2.11 ± 1.49 | 2.70 ± 1.08 | .006 | 0.2[b] |
| Types of initial menu choices, % | | | .609 | |
| No low-calorie item | 15.62 | 15.94 | | |
| One low-calorie item | 42.71 | 34.78 | | |
| Two low-calorie items | 21.88 | 31.89 | | |
| Three low-calorie items | 16.67 | 13.04 | | |
| Four low-calorie items | 3.12 | 4.35 | | |
| Type of final menu choices, % | | | .000 | 0.4[a] |
| No low-calorie item | 14.58 | 2.90 | | |
| One low-calorie item | 31.25 | 10.14 | | |
| Two low-calorie items | 11.46 | 28.99 | | |
| Three low-calorie items | 13.54 | 30.43 | | |
| Four low-calorie items | 29.17 | 27.54 | | |
| Switching among main dishes, % | | | .001 | 0.3[a] |
| To vegetable curry | 8.33 | 28.99 | | |
| No change | 91.67 | 71.01 | | |
| Switching among side dishes, % | | | .019 | 0.2[a] |
| To side salad | 17.71 | 34.78 | | |
| From side salad | 0.00 | 1.45 | | |
| No change | 82.29 | 63.77 | | |
| Switching among desserts, % | | | .021 | 0.2[a] |
| To fruit salad | 16.67 | 33.33 | | |
| No change | 83.33 | 66.67 | | |
| Switching among drinks, % | | | .998 | 0.0[a] |
| To mineral water | 19.79 | 18.84 | | |
| No change | 80.21 | 81.16 | | |
| Initial calorie selection ± *SD*, kcal | 1,043.00 ± 421.01 | 1,020.06 ± 415.02 | .729 | |
| Final calorie selection ± *SD*, kcal | 892.55 ± 509.75 | 669.67 ± 354.46 | .002 | |
| Absolute calorie change ± *SD*, kcal | 150.45 ± 297.94 | 350.39 ± 436.49 | .001 | 0.3[b] |
| Percentage calorie change ± *SD*, % | 15.56 ± 27.13 | 27.95 ± 30.02 | .006 | 0.3[b] |

[a]Cramer's V.
[b]Rank biserial *r*.

percentage of reward coupons in the treatment group (15.94%) than the control group (3.12%). Nevertheless, this significant distinction in coupon redemption rate is mainly attributed to the different nature of the inducement across groups. Since the control intervention is identical for all subjects and targets only the four-low-calorie-item menu, participants whose initial choices contain no low-calorie item

**TABLE 5** Tests of measurement and structural invariance

| | | Comparison with configural model | | | | |
|---|---|---|---|---|---|---|
| **Invariance test** | **Constrained parameters** | **$\Delta\chi^2$** | **Δdf** | **ΔTLI** | **ΔSRMR** | ***p*-value** |
| Metric invariance | Factor loadings | 9.68 | 8 | 0.012 | 0.004 | .288 |
| Scalar invariance | Factor loadings, intercepts | 13.65 | 16 | 0.003 | 0.002 | .625 |
| Strict invariance | Factor loadings, intercepts, residuals | 22.18 | 28 | 0.002 | 0.005 | .773 |

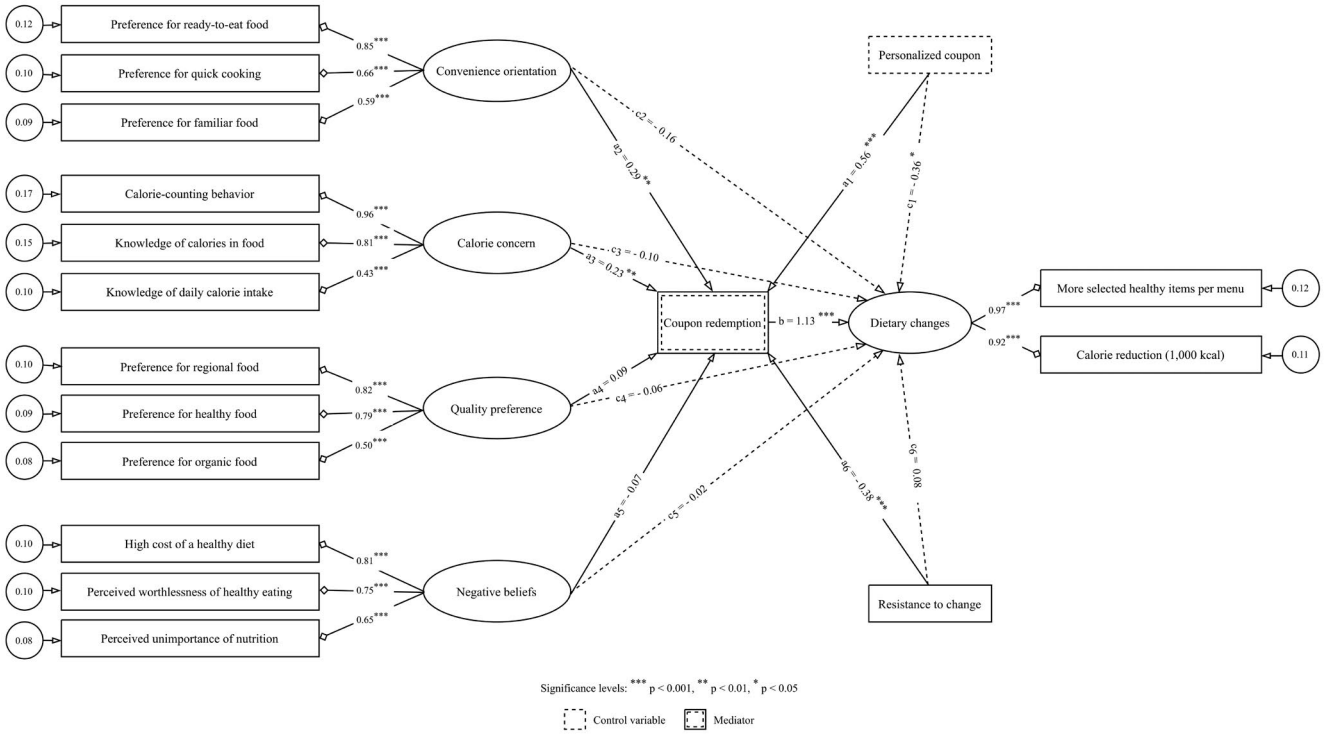


**FIGURE 2** Effects of psychological factors on coupon redemption and dietary changes

**TABLE 6** Direct effects on dietary changes and mediated effects through coupon redemption

| | Mediated effect | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Coef.** | ***SE*** | ***p*-value** | **Bootstrap 95% CI** | **Outcome** | **Direct effect** | **Mediation type** |
| Personalized coupon | 0.63 | 0.12 | .000 | [0.40, 0.86] | + | – | Complementary |
| Convenience orientation | 0.33 | 0.13 | .011 | [0.08, 0.58] | + | Not exist | Indirect only |
| Calorie concern | 0.26 | 0.13 | .047 | [0.01, 0.52] | + | Not exist | Indirect only |
| Quality preference | 0.11 | 0.15 | .483 | [−0.19, 0.40] | Not exist | Not exist | No effect |
| Negative beliefs | −0.08 | 0.15 | .581 | [−0.37, 0.21] | Not exist | Not exist | No effect |
| Resistance to change | −0.43 | 0.11 | .000 | [−0.64, −0.22] | – | Not exist | Indirect only |

*Note:* 5,000 bootstrap samples.

have to change the whole composition of their menus to take advantage of the offer. This drastic change tends to be met with greater reluctance in promotional responses among this group. On the contrary, a large proportion of participants in the treatment group had the option of changing only some elements of their original menus, since most personalized coupons target alternatives with two or three low-calorie items. As a result, these participants are more willing to compromise on their choices and take advantage of the deals.

The preceding argument is supported by the breakdown of menu types after the intervention. Although the percentage of subjects selecting a final menu with four low-calorie items in the treatment group (27.54%) is lower than the control group (29.17%), altogether

the personalized treatment leads to a significantly higher number of low-calorie items per post-intervention choice. The different effects of the two coupon types are further explained by the outcomes of the mediation analysis. Since a smaller proportion of personalized coupons target menus with all four low-calorie items than non-personalized coupons, the personalized approach is found to induce fewer adjustments in the number of selected low-calorie items and subsequent menu calories. However, personalized coupons are overall more effective in bringing about favorable dietary changes than their untargeted counterparts if the mediating effect of their significantly higher coupon redemption rate is taken into account.

Our findings demonstrate the switching behavior among menu items. Except for drinks, receivers of personalized coupons are more likely than control group members to switch to a healthier main dish, side dish, or dessert, with the greatest changes happening among side dishes and desserts. In this experiment, coupons are offered in the form of bundles, which consist of multiple products and are promoted at a special price (Janiszewski & Cunha, 2004). According to Hur and Jang (2015), the main dish in a menu bundle is an anchor item with the greatest importance, whereas side dishes or desserts are tie-in elements, which are perceived as less important (Sarin et al., 2003). In other words, consumers use the main dish to evaluate the overall menu and subsequently adjust their perception based on their evaluations of the remaining items (Yadav, 1994). As a result, consumers are less responsive to a promotional cue that requires them to change the anchor element and more willing to alter their choices on tie-in items. Our study further points to a low rate of switching to mineral water in both treatment groups. This pattern is attributed to the health-halo bias based on the consumer assumption that the prominent items in their choices are healthy, and subsequent underestimation of the overall number of menu calories. For instance, consumers tend to select beverages containing more calories when the main dish or other anchoring items are positioned as healthy (Chandon & Wansink, 2007). As a result of changes in menu item selection, the amount of calorie reduction subsequent to the personalized intervention is significantly higher than the control intervention. This outcome further supports the discussion from Nguyen et al. (2019) regarding the effects of PPP for healthier foods on dietary changes.

Our study finds a strong correlation between coupon redemption and psychological characteristics such as convenience orientation and calorie concern. This emphasizes the significance of consumer perception in their responses to promotion and provides more insights to understand this cognitive process. According to Chandon et al. (2000), promotional responses are not only determined by the economic benefits (e.g., monetary savings) of this action. Price promotions also offer consumers an opportunity to improve the shopping convenience by reducing the search and decision costs, or upgrade to a product of higher quality which would cost more without promotion. Supported by this theory, we find that coupons are perceived as an inducement to opt for a healthier and lower-calorie alternative among convenience-oriented and calorie-conscious consumers. Coupon redemption plays a substantial role in mediating the association between dietary outcomes and such psychological predictors. Our evidence highlights the effectiveness of using discount coupons to encourage lower-calorie foods, particularly among calorie-conscious buyers with budget constraints, or consumers seeking more convenient choices by relying on promotional cues (Carroll et al., 2018; Chandon et al., 2000).

Meanwhile, participants who dislike changing their eating habits are more reluctant to redeem the coupons. Favorable changes in dietary outcomes are also less likely to happen among those consumers. Such negative effects could result from the unfavorable perception consumers with a strong aversion to changes have about promotions targeting options different from their regular choices (i.e., cross-selling coupons). In the FAFH setting, food consumption is frequently repeated and consumers develop behaviors that are strongly influenced by past habits (Orbell & Verplanken, 2010). The resistance to change is more likely to be intensified in such habitual contexts. Hence, food choice is not subject to change unless interventions occur to alter consumer experience and perception over the long term (Lassen et al., 2016).

The mediation analysis reveals no effect of negative beliefs about healthy eating on coupon redemption and subsequent dietary outcomes. Such findings are not consistent with theoretical and empirical evidence from Hardcastle et al. (2015) and Deshpande et al. (2009). Nutritional beliefs are more likely to affect behaviors concerning much deliberation such as adopting a healthy diet as in Deshpande et al. (2009) than an action that requires a swift response as it is the case in our study. Likewise, the direct and indirect effects of quality preference are not found in our model. This could result from the construction of this latent variable, which includes both health and process-oriented dimensions of food quality. Although organic and local foods are frequently perceived as healthy and light on calories (Prada et al., 2017), empirical studies find no direct association between such process-related considerations and the choice of or preference for low-calorie foods (Filimonau et al., 2018; Schifferstein & Oude Ophuis, 1998).

Although a large body of literature demonstrates the effectiveness of price interventions, this study is the first to examine the dietary effects of personalizing price reductions in a real-life setting of FAFH. Our study has another advantage of segmenting consumers based not only on behavioral and dietary criteria but also on promotion responsiveness. This strategy takes consumer segmentation closer to the individual level, thus enhancing the accuracy of coupon personalization (DelVecchio, 2005). In addition, the mediation analysis output provides valuable evidence on how consumers' psychological traits influence their responses to price interventions for low-calorie foods. Such responses include not only immediate changes in purchase decisions following price interventions but also dietary adjustments resulted from these behavioral changes (Hawkes, 2009). Therefore, it is meaningful to examine coupon redemption as a mediator to elaborate the interplay between psychological predictors and dietary outcomes. Including this variable as a mediator and coupon type as a control variable in the SEM provides further explanations on the differential effects of personalized and

non-personalized coupons. Despite its advantages, this study has some methodological limitations. The study participants are generally more active and have a higher education level than the overall population structure in Germany. In addition, the setting of a university canteen does not allow us to explore actual consumption patterns based on purchase histories. When interpreting the treatment effectiveness in this study, it is advisable to take the higher rate of obesity and overweight among recipients of non-personalized coupons into account, despite the statistical insignificance of the between-group difference ($p = .188$).

## 5.2 | Directions for future research

Further research is desirable to validate conclusions drawn from our study on PPP at FAFH establishments and extend our findings to other application areas, such as grocery or online shopping. Moreover, the targeting strategy based on individual calorie needs and deal proneness could be validated in other settings to provide evidence-based recommendations for improving the quality of consumer segmentation and personalization. Interesting research questions and designs for future studies can be derived from the shortcomings of our work. Future work conducted with a more representative sample in a natural shopping environment is recommended. This setting not only enables the accumulation of consumer purchase histories used for segmentation and personalization (Amue et al., 2012) but also facilitates the evaluation of long-term dietary changes. Given the links between culture, food choice, and coupon use (Kim & Yi, 2016; Nestle et al., 1998), it is also important to assess the cross-cultural validity of the present study's outcomes in countries other than Germany.

The better performance of PPP over the non-personalized approach highlights the advantage of adapting this cutting-edge promotional tool to nutritional intervention programs. This strategy is likely to address the limitations of current price reductions such as issues in delivering irrelevant incentives to the wrong target group, overlooking the population at risk, or favoring health-conscious and higher-income consumers (Dallongeville et al., 2011; Muller et al., 2017). Given the increasing digitalization of food-related transactions, it is now feasible for researchers and policymakers to understand consumers individually and modify intervention strategies to fit their personal preferences (Nguyen et al., 2019). This ability to target the right consumers and offer them exactly what they need is the key to preventing the phenomenon of psychological reactance proposed by Brehm (1980) and increasing consumer acceptance of price interventions for healthier foods.

The SEM output underlines the necessity of taking further psychological traits of consumers into account in developing nutritional interventions. A segmentation based on consumer's nutritional perceptions and food motives such as Gong et al. (2020)'s approach could help address consumer heterogeneity and enhance the targeting ability of pricing strategies for healthy food. The promotional cues should be attractive enough to not only attract convenience-oriented and calorie-conscious consumers but also override consumers' resistance to change and induce them to break their existing habits. Future studies should also consider using mixed interventions to generate the best outcome (Rothschild, 1999). For instance, intervention strategies could adopt theories in menu psychology to shift consumers' attention from energy-dense foods while making nutritious alternatives enjoyable and convenient (Stewart et al., 2005; Wansink & Love, 2014). Visually attractive information cues, such as traffic light labels, can be used together with monetary incentives to provide consumers with sufficient dietary knowledge (Drescher et al., 2014). Calorie labeling is particularly beneficial for individuals with low-calorie consciousness in identifying a lower-calorie menu and redeeming coupons that target this option (Ellison et al., 2013). Nutrition information programs are also imperative for reshaping nutritional perception and moderating the negative effects of resistance to change. There are many reasons for people to resist change, including not only external barriers but also internal factors such as the positive evaluation of their current diets and health status (Kearney & McElhone, 1999; Lea & Worsley, 2003). Therefore, a closer investigation into consumer perception is necessary to understand such underlying factors and design information programs accordingly. Furthermore, the effects of quality preference and negative beliefs about healthy eating should be examined more thoroughly.

The COVID-19 pandemic is another important issue to consider in future research on this topic. Empirical evidence shows that the lockdown affects consumers' eating habits negatively, with an upward trend in snack and unhealthy food consumption (Pellegrini et al., 2020; Robinson et al., 2020), or decreasing willingness to pay for fresh products (Laguna et al., 2020; Wang et al., 2020). Declines in income and mental health contribute further to poorer food choices, given that the negative impacts are disproportionately greater for low-income households or obese people than other population groups (Laborde et al., 2020; Pellegrini et al., 2020; Robinson et al., 2020). As a result, it is even more necessary now than before the pandemic for future research to focus on price interventions to promote healthier food choices and tackle the obesity issue. The social distancing regulations and temporary closure of FAFH establishments create a sudden shift towards food delivery and online grocery shopping, with many consumers using such services for the first time (Baker et al., 2020; Grashuis et al., 2020). Despite possible decreases in demand after the pandemic, a large proportion of these new adopters are likely to continue utilizing them, which facilitates the digitalization of food-related transactions to a greater extent than would have been the case without this pandemic (Hobbs, 2020). This presents more opportunities to examine consumer purchase histories and customize marketing offers or intervention strategies to individual needs (Richards & Rickard, 2020). However, this trend requires a deeper understanding of consumers' online shopping behavior, which is characterized by a different degree of impulsiveness and information processing than point-of-sale decisions (Jeffrey & Hodge, 2007; Verhagen & van Dolen, 2011). Hence, the design of PPP approaches should be adjusted accordingly.

## 6 | CONCLUSIONS

In short, our research casts a new light on the effects of PPP on food products, and underlines the potential for utilizing this personalized promotional tool to motivate healthy eating. This study not only contributes to the understanding of consumer response to promotion but also provides valuable input for implementing and evaluating food-related PPP. More importantly, the study outcomes form the first steps toward developing an emerging instrument to address the drawbacks of existing price promotions for healthier foods with the assistance of information technology. Implications from our research are therefore of great importance to not only food marketers and consumer researchers, but also policy makers.

### ACKNOWLEDGMENTS

The work was supported by the *enable* Cluster (http://enable-cluster.de) and funded by a grant from the German Ministry for Education and Research (BMBF) under the registration number FK01EA1409D.

### CONFLICT OF INTEREST

The corresponding author and co-authors have no conflict of interest to disclose.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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**How to cite this article:** Nguyen, M. T. T., Emberger-Klein, A., & Menrad, K. (2022). Some like it tailor-made: The effectiveness of personalized coupons for lower-calorie food choices at a university canteen. *International Journal of Consumer Studies*, 46, 744–762. https://doi.org/10.1111/ijcs.12723

## APPENDIX A

**List of menu items by category and calorie content**

| Menu items | kcal |
|---|---|
| Main dish | |
| Vienna-style pork schnitzel | 848 |
| Indian curry with vegetables | 227 |
| Side dish | |
| French fries | 422 |
| Potato salad | 94 |
| Organic rice | 207 |
| Mixed salad | 15 |
| Dessert | |
| Blackberry yogurt | 249 |
| Fruit salad | 87 |
| Drink | |
| Coke | 210 |
| Orange-flavored soft drink | 190 |
| Lime-flavored soft drink | 185 |
| Mixed soft drink | 215 |
| Apple spritzer | 210 |
| Apple- and peach-flavored drink | 250 |
| Red currant flavored drink | 290 |
| Apple- and lemon-grass flavored drink | 50 |
| Blood orange- and coriander-flavored drink | 50 |
| Strawberry-, black-current- and mint-flavored drink | 50 |
| Mineral water | 0 |

## APPENDIX B

**Psychological statements and indicators of data suitability for SEM**

| Variables | Statements (1 = very untrue of me, 6 = very true of me) | Sources | KMO | CR | AVE |
|---|---|---|---|---|---|
| Convenience orientation | | | | 0.76 | 0.51 |
| Preference for ready-made food | I often use ready-to-eat foods and instant mixes in my cooking | Scholderer et al. (2004) | 0.67 | | |
| Preference for quick cooking | At home, I prefer to cook meals that can be prepared quickly | Candel (2001) | 0.55 | | |
| Preference for familiar food | I only eat foods that are familiar to me | Scholderer et al. (2004) | 0.65 | | |
| Calorie concern | | | | 0.80 | 0.54 |
| Calorie-counting behavior | I count calories in order to keep my weight under control | Lundholm and Wolins (1987) | 0.56 | | |
| Knowledge of calories in food | I know the calorie content of the food and beverages I consume | Lundholm and Wolins (1987) | 0.54 | | |
| Knowledge of daily calorie intake | I have trouble knowing how many calories I should consume in a day (reversed) | Gracey et al. (1996) | 0.68 | | |
| Quality preference | | | | 0.78 | 0.50 |
| Preference for regional food | I do not mind paying more money for regional products | Scholderer et al. (2004) | 0.80 | | |
| Preference for healthy food | I am willing to pay more for healthy food | Scholderer et al. (2004) | 0.68 | | |
| Preference for organic food | I always select organic food if I have the opportunity | Scholderer et al. (2004) | 0.60 | | |
| Negative beliefs on healthy eating | | | | 0.83 | 0.55 |
| High cost of a healthy diet | I find that a healthy diet is too expensive | Gracey et al. (1996) | 0.70 | | |
| Perceived worthlessness of healthy eating | It is not worth putting much effort into maintaining a healthy diet | Gracey et al. (1996) | 0.76 | | |
| Perceived unimportance of a healthy diet | A healthy diet is an important determinant for a healthy life (reversed) | O'Connell et al. (1981) | 0.73 | | |
| **Indicators of data suitability for SEM** | | | | | |
| Overall Kaiser–Meyer–Olkin (KMO) | | | | | 0.66 |
| Bartlett's test of sphericity | | | | | $\chi^2(66) =, p < .001$ |