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Attribute Segmentation and Communication Effects on Healthy and Sustainable Consumer Diet Intentions

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Abstract: A shift towards more sustainable consumer diets is urgently needed. Dietary guidelines state that changes towards less animal-based and more plant-based diets are beneficial in terms of sustainability and, in addition, will have a positive effect on public health. Communication on these guidelines should be most effective when tailored to the motivations of specific consumer segments. Therefore, the current study (1) segments consumers based on the importance they attach to sustainability, health, taste and price of food in several food categories; and (2) tests different ways (with health arguments, sustainability arguments, or both) of communicating the dietary guideline. Three segments have been identified: pro-self, average, and sustainable conscious consumers. For pro-self and average consumers, the communication of both health and sustainability benefits made them think most about sustainability, although communication did not result in changes in dietary intentions in these segments. For sustainable conscious consumers, intention to reduce their meat consumption increased when both health and sustainability benefits were communicated. These research outcomes indicate the importance of segmentation research in the development of dietary messages. In addition, the findings show the importance of taking product category differences into account in studying consumer food motivations and intentions.

Keywords: communication; consumer segmentation; attributes; food; sustainability; health; experiment; dietary guidelines

1. Introduction

Food consumption patterns are increasingly related to health (e.g., obesity) and sustainability (e.g., environmental pollution and animal welfare issues) challenges [1–5]. Sustainability of food consumption includes a reduction of the ecological footprint related to carbon emission, water and energy use in production and transportation of food, animal welfare and fair trade. A shift towards more sustainable and healthy diets is urgently needed and therefore synergies between sustainability and health are important [3,6–8]. Many countries provide national dietary guidelines to inform their citizens and advise them on their food consumption. Currently, nutritional guidelines are focused on the healthiness of a diet, but debates on whether these guidelines should consider health and sustainability aspects of diets simultaneously are emerging. While Lang and colleagues [9] already pled for the integration of human health and environment ("planetary health") in the field of food, even more specifically Hoek and colleagues [10] recommended that health should remain the

overarching principle for policies and actions concerned with shifting consumer behaviors, as this personal benefit appears to have a greater potential to support behavior change.

Recently, the Live Well for LIFE project funded by the EU and WWF formulated the following policy recommendation: "National governments should develop policies to give more balanced, integrated dietary recommendations on healthy and sustainable diets" [11]. In 2011, the Health Council of the Netherlands published a pioneering report in which guidelines for a healthy diet were evaluated from an ecological perspective [12]. This report concludes that the use of less animal-based and more plant-based diets would lead to health and ecological gains simultaneously. In the US, a governmental advisory report with similar conclusions has been published recently [13]. Changes towards more plant-based and less animal-based diets have been widely acknowledged in the scientific literature as benefiting both healthiness and sustainability of present-day diets [5,7,12,14–16]. A less animal-based diet would significantly reduce emissions, is beneficial in terms of animal welfare, and can improve public health [3,16]. In addition, increased consumption of fruits and vegetables would promote public health [17–21]. Currently, adherence to nutritional guidelines is low. Current intake levels of fruits and vegetables are far below recommendations in most European regions as well as in the US [17,18,21–23], and meat intake is too high in many affluent countries [3,14,24] despite nutritional campaigns.

Consumers have an important role to play in the desired shift towards more healthy and sustainable diets [6,25–29]. In order to achieve a change in consumers' dietary patterns, a whole range of interventions can be used. Rothschild [30] developed a conceptual framework for interventions in the public health domain. He poses that motivation, opportunity (a supporting environment) and ability (knowledge and skills) are prerequisites for behavior change. Education (information), marketing (environmental incentives) and law are identified as the three main categories of interventions. The expected effectiveness of these three categories of interventions depend on the level of motivation, opportunity and ability. For example, when consumers are motivated but lack ability, education can help to develop the ability to behave. Which of the three aspects is most important to a person also depends on his or her stage of change towards more healthy and/or sustainable diets [31]. First, awareness should be created that something needs to be changed, which may result in increased motivation. Education can help to create awareness. When a person is motivated to change, the person should be able and have the opportunity to conduct the desired behavior [31].

Information campaigns and educational measures are by far the most used interventions in Europe that aim to achieve behavior change towards more healthy diets. The effectiveness of such campaigns on awareness and attitudes seems quite strong; but so far, nutritional campaigns have had limited success in changing behavior [32–35]. Also, in the domain of sustainable behavior, information has not proven very successful in achieving behavior change [36]. A possible reason for the ineffectiveness of food campaigns can be the "one-size-fits-all approach" [37]. As an antidote to this approach, the essential role of audience segmentation in developing effective communication is widely acknowledged [37–42]. Consumer populations are heterogeneous and should be segmented into more homogenous subgroups with regard to key characteristics [43]. Consumers can differ, for example, in their food choice motives, which are important determinants of food choices [24,44–49] and are food-category specific [47]. Because consumers differ in the importance they attach to food choice motives, they may also differ in the arguments and information that appeal to them most. Nutrition campaigns may benefit from developing tailored messages that fit the motives of the receiver, because motivation is an important determinant of the way in which a message is cognitively processed and perceived [50]. Therefore, it might not be advisable to communicate dietary guidelines as either guidelines for a healthy diet, or guidelines for a healthy and sustainable diet. The most effective communication in terms of behavior change might depend on the motivations of the audience.

Intuitively, it seems favorable to focus on more than one motive in nutrition interventions, in order to ensure that arguments appeal to different consumers. In addition, a dietary change might be perceived as more attractive when multiple goals can be simultaneously satisfied by

performing a single act. Kareklas, Carlson and Muehling [51] show that promoting organic meat with both health arguments and environmental arguments is more effective in stimulating organic purchases as compared to an ad providing only health arguments. On the other hand, there are several reasons to believe that it might not always be beneficial to combine arguments within the same communication [52]. Motives can sometimes be conflicting or be perceived as conflicting [6,53,54]. In this context, it is useful to note two important distinctions in food choice motives. First, some motives relate to present-based benefits (e.g., price), whereas other motives relate to future-based benefits (e.g., health and sustainability) [55]. Second, some motives are related to individual benefits (e.g., price or health) whereas other motives are related to social benefits (e.g., sustainability) [6,56]. Consumers differ in whether they focus more on current or future benefits [57] and whether they attach more importance to egoistic or altruistic/biospheric values [58,59]. A mismatch between a message and the audience can undermine the credibility and the persuasiveness of the message [39].

The literature does not provide a decisive answer on whether nutritional guidelines can best be communicated as healthy, sustainable or both. Our first hypothesis is that the optimal communication differs across motive-based population subgroups, because we expect a message to be most effective when it matches the motives of the audience. Second, we hypothesize that the effect of such an informational intervention on behavioral intentions will differ across motive-based segments, as providing information is probably not sufficient when motivation is low. In short, the current study aims to identify and characterize motive-based consumer segments and to explore how the nutritional guideline should best be communicated to the identified segments in order to increase their intention to consume according to this guideline.

2. Materials and Methods

An online consumer survey was used to gather cross-sectional data in the Netherlands. A research agency collected the data in spring 2014. The sample was representative for the Dutch adult population in terms of age, gender and education. Selection criteria were used to exclude consumers who never or seldom make dinner choices and/or never or seldom shop for groceries. The survey consisted of two parts. The second part was filled out approximately one week after the first part. In the first part, the segmentation variables, the profiling variables and socio-demographic variables were assessed. In the second part, the respondents were randomly assigned to one of four experimental conditions. After the experiment, respondents were asked to fill out the manipulation checks and the dependent measures. In total, 1308 respondents filled out the first survey. Of these 1308 respondents, 829 also participated in the experiment; 46.1% of whom were male and 53.9% were female. The respondents' age ranged from 18 to 90 years with a mean of 50.1 years (the total Dutch population in 2014 consisted of 50.5% females, with a mean age of 41.0 years).

The study consists of three aspects. First, segmentation variables that measure food choice motives are used to identify motive-based consumer segment. Second, profiling variables are used to gain insights into the characteristics of these segments that are important to consider in the development of effective (information) interventions. Third, the experiment will be used to test the hypothesis that (1) the optimal way of communicating the guideline differs across the identified segments; and (2) the effectiveness of such an informational intervention on behavioral intentions differs across the identified segments.

Segmentation variables: The identification of consumer segments was based on the importance consumers attached to a range of food-category specific motives. Price, taste, healthiness and a range of sustainability aspects were included. The perceived importance of these aspects was assessed for each of four product categories, as previous research showed that importance of motives is category specific [47]. Motives were measured with the following question: "I think it is important that [food category] is [motive]". An example item is: "I think it is important that dairy is animal friendly". The items were rated on seven-point Likert scales (1 = Totally disagree, 7 = Totally agree) [41]. In total, 55 items were included (see Figure 1). Data reduction was applied by conducting an exploratory

factor analysis (EFA) with oblique rotation on the 13 or 14 ratings for each of the product categories separately to estimate the underlying factors. Though a detailed explanation of the procedure is beyond the scope of this article (for more information, see [47]), eight factors emerged from the analysis: one pro-self factor including price, taste and health; and one pro-social factor including all sustainability attributes for each of the four product categories. The total variance explained was 74.7% for dairy, 75.4% for meat, 76.8% for fish and 71.1% for vegetables. The resulting factor scores were mean centered per respondent, in order to cancel out response tendencies [60]. The correlations between the pairs of mean-centered factor scores were -0.353 for dairy, -0.362 for meat, -0.135 for fish and -0.404 for vegetables (all $p < 0.01$). The reliability scores (Cronbach's alpha) for the eight factors ranged from 0.793 to 0.968. Data reduction was checked with a confirmatory factor analysis (CFA) for each food category, each with two factors. Each of these models yielded comparable factor loadings and satisfactory fit (a Root Mean Square Error (RMSE) below 0.07 [61] and a Standardized Root Mean Square Residual (SRMR) below 0.08 indicate satisfactory model fit [62]. Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI) and Goodness of Fit Index (GFI) of at least 0.90 indicate a satisfactory model fit [62,63]. Dairy: RMSE = 0.09, NNFI = 0.98, CFI = 0.98, SRMR = 0.03, GFI = 0.93; Meat: RMSE = 0.09, NNFI = 0.98, CFI = 0.98, SRMR = 0.02, GFI = 0.93; Fish: RMSE = 0.11, NNFI = 0.98, CFI = 0.98, SRMR = 0.03, GFI = 0.91; Vegetables: RMSE = 0.13, NNFI = 0.96, CFI = 0.97, SRMR = 0.04, GFI = 0.88), except for RMSE and, for vegetables, GFI.

To me it is important that **dairy**	To me it is important that **meat**	To me it is important that **fish**	To me it is important that **vegetables**
...is sustainable	...is sustainable	... is sustainable	...are sustainable
...is healthy	...is healthy	...is healthy	...are healthy
...is environmental friendly	...is environmental friendly	...is environmental friendly	...are environmental friendly
...gives little waste	...gives little waste	...gives little waste	...give little waste
...comes from the Netherlands	...comes from the Netherlands	...comes from the sea close to the Netherlands	...come from the Netherlands
...has a short transportation distance	...has a short transportation distance	...has a short transportation distance	...have a short transportation distance
...is animal friendly	...is animal friendly	...is caught in a sustainable way	...are seasonal
... comes from cows that walked outside	... comes from animals that walked outside	... is stated on the 'sustainable fish index'.	
...that I eat/drink is sustainable	...that I eat is sustainable	...that I eat is sustainable	...that I eat are sustainable
...has a sustainability logo	...has a sustainability logo	...has a sustainability logo	...have a sustainability logo
...comes from cows with a low usage of antibiotics	...comes from animals with a low usage of antibiotics	...comes from animals with a low usage of antibiotics	...have a low usage of pesticides
...is tasty	...is tasty	...is tasty	...are tasty
...is affordable	...is affordable	...is affordable	...are affordable
...is healthy and sustainable	...is healthy and sustainable	...is healthy and sustainable	...are healthy and sustainable

Figure 1. Segmentation variables.

The mean-centered factor scores on the importance of product-category attributes were used as segmentation variables in a two-step cluster analysis, performed in the Statistical Package for Social Sciences (SPSS 22). In the first step, a hierarchical agglomerative clustering procedure determined the number of clusters [64]. Log-likelihood was used as distance measure [65]. Cluster centroids were determined to be used as initial starting points in the second step [64,66]. In the second step, K-means clustering was used to group respondents into the final clusters [65]. Merging of clusters may depend on the input order of the cases [65] and therefore, analyses were run 10 times with randomly ordered cases [44,67]. Based on a combination of the lowest Bayesian Information Criterion (BIC) in the 10 runs, the agglomeration schedule and interpretability, the final cluster solution was chosen.

Profiling variables: A range of profiling variables was included to gain more insight into the characteristics of the segments. Food intake and behavior regarding the dietary guideline were included to evaluate how the identified segments currently perform in terms of sustainable food behavior. Life values, time orientation, agreement regarding the dietary guideline, stage in the transition towards more healthy and towards more sustainable eating, and socio-demographic and background characteristics were used as profiling variables, because these are important determinants of food intake and can give insights in how the segments can best be targeted.

Life values have been measured with a short version of Schwartz's value scale, developed by [59]. The scale included egoistic, altruistic and biospheric values measured with 13 items. Respondents were asked to rate the importance of the 13 values "as guiding principles in their lives" on a seven-point scale (1 = "Very unimportant", 7 = "Very important"). The 13 items were included in a factor analysis with oblique rotation. Three underlying factors were identified. The first factor included all biospheric values and explained 37.8% of the item variance. Cronbach's alpha of the four items was high ($\alpha = 0.90$). The second factor included all egoistic values and explained 20.7% of the item variance. Cronbach's alpha could be improved by deleting "ambition". The remaining four items had a Cronbach's alpha of 0.78. The third factor included all altruistic values and explained 7.8% of the item variance. Cronbach's alpha of the four items was 0.84. The three constructs have been computed by averaging the items.

Time orientation has been measured with a short version of the Consideration of Future Consequences scale (CFC) [68]. Four items have been selected (items 1, 2, 10 and 11 of the original scale): the two items that scored highest on the consideration of future consequences factor and the two items that scored highest on the consideration of immediate consequences factor in a previous study [69]. The items were measured on a 7-point scale (1 = "Totally disagree", 7 = "Totally agree"). The four items were captured by two factors (CFC-future and CFC-immediate), explaining 41.5% and 34.4% of the variance, respectively. Cronbach's alpha of the scales were 0.69 and 0.67, respectively. The two constructs have been computed by averaging the items.

Agreement with and general behavior related to the dietary guideline stating the advice to eat less animal-based and more plant-based diets has been measured with two items. The items were: "A less animal-based (e.g., meat and dairy) and more plant-based (e.g., vegetables) diet is healthy and sustainable" and "While grocery shopping, I always consider the healthiness and the sustainability of the meal". The respondents were asked to indicate on a 7-point scale (1 = "Totally not", 7 = "Totally") whether they agreed with the statements.

Stage of change has been measured with four statements about health and four statements about sustainability. These statements reflected the respondents' commitment to purchase healthy or sustainable food. The stages are based on the transtheoretical model [31] and represent a pre-contemplation stage, a contemplation stage, a preparation stage and an action and maintenance stage. The statements were adapted for healthy food and sustainable food from Gwozdz, Netter, Biartmarz and Reisch [70]. Respondents were asked to think about how important sustainability, respectively healthiness, are when they buy food. Subsequently they were asked to choose one of the four health statements and one of the four sustainability statements that best matched their considerations. The four statements were: "I base my food purchase decisions on price, taste, quality and/or convenience. I am not concerned with sustainability [health] issues and I don't think about them when I purchase food," "I believe that sustainability [health] is important, but it is too difficult and time-consuming to base my food purchase decisions on them," "When it is easy to do, I use sustainability [health] information on these issues in my purchase decisions," and "I make an effort to learn about sustainability [health], and I am willing to pay more or sacrifice on product quality in order to use sustainability [health] in my food purchases".

Food intake has been measured with thirteen items. The respondents were asked to indicate how many days a week (0 to 7) they ate a range of products or meals. The included items were: (1) organic meat, organic fruits and vegetables, organic dairy, organic eggs, free range meat, products

with a sustainability logo; (2) small portions of meat, small portions of dairy, small portions, seasonal vegetables; (3) vegetarian burgers, no meat; and (4) no dairy. Four underlying factors were identified. The first factor included consumption of sustainable products and explained 32.0% of the item variance. Cronbach's alpha of the six items was high ($\alpha = 0.85$). The second factor included items concerning the consumption of small portions of food products and seasonable food and explained 13.4% of the item variance. Cronbach's alpha of the four items was 0.64. The third factor included consumption of vegetarian meals and explained 10.4% of the item variance. Cronbach's alpha of the remaining two items was 0.52. The last factor consisted of only one item, dairy-free meals, and explained 8.5% of the item variance. The constructs have been computed by averaging the items, thus indicating the average frequency of consuming a particular food category. Finally, questions on gender, age, education, income, and family composition were included in the survey. Differences between the resulting segments on the profiling variables were investigated through ANOVA and Chi-square tests, depending on the measurement scale of the variable.

Experimental design: The experiment was a 2×2 (health arguments vs. sustainability arguments) full-factorial between-subjects design in which participants were randomly assigned to one of four conditions: (1) a health condition received information on health benefits of having a less animal-based and more plant-based diet; (2) a sustainability condition received information on sustainability benefits of having a less animal-based and more plant-based diet; (3) a health and sustainability condition received combined information; and (4) a control condition received neutral information on eating behavior (without health or sustainability arguments) (see Appendix A). After having read the information, the participants were asked to note a few words (one to five) that came to their mind when they thought about healthy eating, sustainable eating, healthy and sustainable eating, and eating in general, respectively in the four conditions, in order to force them to think of these aspects. In addition, they were asked to give an example of a healthy, a sustainable, a healthy and sustainable, or general food choice, respectively in the four conditions, again to force them to think of these aspects.

As a manipulation check, respondents were asked on a 7-point scale (1 = "Very little", 7 = "Very much") to indicate to what extent the text they had just read made them think about healthiness, sustainability, price, taste and convenience of food. A second manipulation check was conducted by counting the number of times certain words were associated with the information texts in the four conditions. To assess the impact of the experimental manipulation, one-way between-subjects ANOVAs were carried out on the first manipulation check. The same analyses were repeated per identified segment, in order to see whether the manipulation differed in effectiveness across segments. For the second manipulation check, two researchers recoded the words that were mentioned into broader categories. Frequencies of categories with more than 20 counts were compared across conditions using Chi-squared tests.

For the main analyses, a general linear model was used to test the main effect of experimental manipulation, the main effect of segment, and the interaction effect between manipulation and segment. The dependent variables included a range of sustainable and unsustainable food choice intentions related to dinner options. Respondents were asked to indicate, for each of 26 dinner components, the number of days (0–7) in the following week they intended to choose that component for their dinner. The options differed in quantities of unsustainable food (meat and dairy) as well as in sustainability of the production method (e.g., organic and animal friendly) and components were related to one of four product categories: vegetables, dairy, meat and "other". Five underlying factors were identified with a total explained variance of 67.0%. The first factor included consumption intentions of sustainable products and explained 38.1% of the item variance. One item, consumption of small portions of meat, has been removed from the scale in order to improve its reliability. The remaining six items had a Cronbach's alpha of 0.92. The second factor included items concerning intentions to consume meals with (regular and large amounts of) meat and explained 12.9% of the item variance. Removing the item concerning consumption of large amounts of meat improved the reliability of the scale. Cronbach's alpha of the remaining three items was 0.84. The third factor included items concerning intentions

to consume meals with (regular) dairy and explained 6.7% of the item variance. Deletion of the item concerning the intention to consume small amounts of dairy improved the reliability of the scale leading to a Cronbach's alpha of 0.86 for the remaining three items. The fourth factor included items concerning intentions to consume meals with vegetables and regular products and explained 5.1% of the item variance. Cronbach's alpha of the four items was 0.75. The final factor included consumption intentions of large amounts of meat, large amounts of vegetables and products that could be used as meat replacers (nuts, fish, meat replacers, legumes) and explained 4.2% of item variance. Cronbach's alpha of the eight items was 0.88. The factors were moderately correlated, with values ranging from 0.11 to 0.52. The constructs have been computed by averaging the items.

3. Results

3.1. Segmentation on Food Category Attribute Importance

The first step in the data analysis was the classification of respondents into homogenous consumer segments. The cluster analysis resulted in three segments with relatively homogenous importance ratings of the food category specific attributes:

1. Pro-selves
2. Average consumers
3. Conscious consumers

The cluster centroids are shown in Table 1.

Table 1. Cluster centroids.

Segmentation Variable	Pro-Self [1]	Average	Conscious
	Mean (sd)	Mean (sd)	Mean (sd)
Dairy_Sustainable	−0.80 [a] (0.68) [2]	−0.19 [b] (0.32)	0.31 [c] (0.32)
Dairy_Healthy/Tasty/Affordable	0.75 [a] (1.14)	0.22 [b] (0.43)	−0.31 [c] (0.46)
Meat_Sustainable	−0.70 [a] (0.79)	−0.18 [b] (0.35)	0.27 [c] (0.37)
Meat_Healthy/Taste/Affordable	0.90 [a] (1.00)	0.26 [b] (0.38)	−0.37 [c] (0.58)
Fish_Sustainable	−0.84 [a] (0.84)	−0.18 [b] (0.32)	0.31 [c] (0.31)
Fish_Healthy/Tasty/Affordable	0.27 [a] (1.52)	0.24 [a] (0.38)	−0.20 [b] (0.42)
Vegetables_Sustainable	−0.63 [a] (1.026)	−0.31 [b] (0.40)	0.33 [c] (0.31)
Vegetables_Healthy/Tasty/Affordable	1.04 [a] (0.50)	0.14 [b] (0.42)	−0.34 [c] (0.51)

[1] The pro-self cluster included 116 respondents (14.0%), the average cluster included 253 respondents (30.5%), and the conscious cluster included 460 respondents (55.5%). [2] Different superscripts indicate significantly different means in each row following ANOVA post-hoc Tukey test at $p < 0.05$.

Cluster 1 was the smallest segment, including 14.0% of the respondents. This cluster scored relatively high on all pro-self factors and relatively low on all sustainability factors. Apparently, the relative importance of pro-self attributes (price, taste and health) was higher in this cluster compared to the other clusters. Therefore, this cluster was labeled the pro-self cluster. The pro-self cluster consisted of 53% males and the mean age was 47 years.

Cluster 2 represented 30.5% of the respondents. Respondents in this cluster attached about average importance to pro-self factors and sustainability factors for all product categories. Therefore, this cluster was labelled "average consumers". The average cluster consisted of 50% males, and the mean age was 50 years. This segment had the highest number of respondents in the youngest age group (18–29 years).

Cluster 3 was the largest cluster, representing 55.5% (N = 460) of the sample. This cluster attached relatively high importance to the sustainability attributes compared to pro-self attributes. Therefore, this cluster was labelled "sustainable conscious consumers" (or "conscious consumers"

in short). Cluster 3 consisted of 58% females and had the highest mean age of 53 years, and the highest percentage of people over 65 years of age.

The segments did not show any significant differences in education, income and household composition. In addition, the segments did not differ in the number of times per week the respondents cooked a hot meal, went grocery shopping, or decided what would be served for dinner.

3.1.1. Life Values and Time Orientation

Both egoistic motives ($F(2826) = 4.39$, $p < 0.05$) and biospheric motives ($F(2826) = 34.60$, $p < 0.001$) differed significantly between segments. Pro-selves had a significant lower mean score ($M = 3.11$) on egoistic motives than average consumers ($M = 3.42$) and conscious consumers ($M = 3.45$). Altruistic values showed no significant differences. Biospheric values were lowest for pro-selves ($M = 4.60$), followed by average consumers ($M = 5.21$) and conscious consumers had the highest mean score on biospheric values ($M = 5.58$). Peace, equality and justice were the most important values for pro-selves as well as for average consumers. Conscious consumers also valued peace and equality most, but protection of nature scored on the third place for this segment.

Consideration of future consequences differed significantly between the segments ($F(2826) = 21.86$, $p < 0.001$) with conscious consumers ($M = 4.43$) considering future consequences more than the pro-selves ($M = 3.71$) and average consumers ($M = 3.98$). Consideration of immediate consequences did not differ significantly across segments ($M = 3.78$ for pro-selves, $M = 3.72$ for average consumers, and $M = 3.56$ for conscious consumers).

3.1.2. Agreement with the Dietary Guideline and Related Behavior

Agreement with the dietary guideline ($F(2826) = 37.29$, $p < 0.001$) and the consideration of healthiness and sustainability in food purchasing ($F(2826) = 80.57$, $p < 0.001$) both differed significantly across segments. Pro-selves ($M = 4.08$) and average consumers ($M = 4.38$) agreed to a lesser degree that eating less animal-based and more plant-based food provides health and sustainability benefits than conscious consumers ($M = 5.15$). Pro-selves also considered health and sustainability least while grocery shopping ($M = 3.09$), followed by average consumers ($M = 3.86$), and conscious consumers considered health and sustainability most ($M = 4.77$).

3.1.3. Transition Stage

A large majority (69.8%) of pro-selves were beginning to make the transition towards sustainable food choices and towards health (42.2%). About half of the average consumers were beginning to make the transition towards sustainable consumption, but they were equally divided over the transition stages towards healthy food consumption. Conscious consumers were about equally divided over the transition stages towards sustainable consumption, but more than a third (36.5%) were in the most progressed stage towards healthy food consumption, indicating that health was important in their food purchases.

3.1.4. Food Intake

Intake of sustainable food products ($F(2826) = 86.15$, $p < 0.001$), small portions ($F(2826) = 7.19$, $p < 0.01$), and vegetarian meals ($F(2826) = 12.30$, $p < 0.001$) all differed significantly between the segments. Pro-selves consumed sustainable products the least frequently ($M = 0.51$), followed by average consumers ($M = 1.04$), and conscious consumers consumed sustainable products the most frequently ($M = 1.98$). Regarding the intake of small portions, pro-selves scored significantly lower ($M = 2.84$) as compared to average consumers ($M = 3.19$) and conscious consumers ($M = 3.41$). Vegetarian intake was significantly more frequent for conscious consumers ($M = 1.24$) than for pro-selves ($M = 0.74$) and average consumers ($M = 0.81$).

3.2. Effect of Communication on Thoughts and Meal Intentions

Overall, the manipulation checks showed that respondents in both the sustainability condition and the combined condition had started to think more about sustainability than those in the health and control conditions ($F(3825) = 12.37$, $p < 0.001$). In addition, respondents in the control condition thought more about taste than those in the other conditions ($F(3825) = 12.598$, $p < 0.001$) (see Table 2). No differences were found across conditions in the extent to which the provided information made the respondents think of healthiness, convenience and price.

Concerning differences between segments in the amount of thoughts after the manipulations, several significant differences were found (see Table 2). Respondents in the pro-self segment who received health and sustainability arguments indicated that the information made them think more about sustainability, compared to pro-selves in the control group ($F(3112) = 3.31$, $p < 0.05$). In addition, taste showed a significant result ($F(3112) = 3.17$, $p < 0.05$), but no significance between the four conditions have been found in a post-hoc test. For average consumers, differences across conditions were found for sustainability thoughts ($F(3249) = 3.02$, $p < 0.05$) and taste thoughts ($F(3249) = 5.43$, $p < 0.01$). Respondents in the health and sustainability condition thought more about sustainability than respondents in the healthy condition. In addition, respondents in the control condition thought more about taste compared to those in the healthy and sustainable, and sustainable conditions. For conscious consumers, thoughts about sustainability ($F(3456) = 4.46$, $p < 0.01$) and taste ($F(3456) = 6.17$, $p < 0.001$) also differed across conditions, but the pattern of differences between conditions differed slightly from what had been found for the average consumers (see Table 2). Those in the sustainable condition thought more about sustainability than those in the control and healthy conditions. In addition, those in the control condition thought more about taste compared to the other conditions.

Table 2. Manipulation check. [1]

Communication Type	N	Attributes				
		Health	**Sustainability**	**Price**	**Taste**	**Convenience**
Total sample						
Control	209	4.90 [a,2]	3.98 [a]	4.68 [a]	5.74 [a]	4.64 [a]
Healthy	205	5.02 [a]	4.04 [a]	4.37 [a]	5.16 [b]	4.49 [a]
Sustainable	210	4.91 [a]	4.65 [b]	4.70 [a]	5.02 [b]	4.32 [a]
Healthy & sustainable	205	5.00 [a]	4.71 [b]	4.68 [a]	5.01 [b]	4.46 [a]
Pro-self consumers						
Control	35	4.09 [a]	2.51 [a]	4.26 [a]	5.60 [a]	4.20 [a]
Healthy	33	5.03 [a]	2.97 [a,b]	4.64 [a]	5.24 [a]	4.61 [a]
Sustainable	29	4.07 [a]	3.55 [a,b]	4.66 [a]	4.45 [a]	3.76 [a]
Healthy & sustainable	19	4.26 [a]	3.79 [b]	3.79 [a]	4.37 [a]	3.74 [a]
Average consumers						
Control	73	4.90 [a]	3.81 [a,b]	4.66 [a]	5.71 [a]	4.63 [a]
Healthy	63	4.92 [a]	3.71 [a]	4.19 [a]	5.10 [a,b]	4.19 [a]
Sustainable	64	4.67 [a]	4.23 [a,b]	4.52 [a]	4.95 [b]	4.05 [a]
Healthy & sustainable	53	5.04 [a]	4.40 [b]	4.62 [a]	4.85 [b]	4.43 [a]
Conscious consumers						
Control	101	5.18 [a]	4.61 [a]	4.85 [a]	5.80 [a]	4.79 [a]
Healthy	109	5.08 [a]	4.56 [a]	4.39 [a]	5.17 [b]	4.63 [a]
Sustainable	117	5.26 [a]	5.15 [b]	4.80 [a]	5.20 [b]	4.61 [a]
Healthy & sustainable	133	5.09 [a]	4.97 [a,b]	4.83 [a]	5.17 [b]	4.57 [a]

[1] "To what extent did the text above make you think of the following aspects of food?" (1 = very little, 7 = very much). [2] Different superscripts in each column (per cluster) indicate significantly different means following ANOVA post-hoc Tukey test at $p < 0.05$.

The results of the open-ended question in which respondents were asked to mention a few words that came up after they read the manipulation confirmed the manipulations (see Appendix B). Those in the control condition mentioned taste most often. In addition, product groups such as meat, bread, potatoes, pasta and rice were often mentioned, as were general food aspects such as hunger, grocery shopping and cooking. Respondents in the sustainable, and the healthy and sustainable condition, most often thought about all kinds of sustainability aspects such as environmentally friendly, Fair Trade, animal friendly, regional, ecological, seasonal and vegetarian, but also expensiveness was mentioned frequently in these conditions. Respondents in the health condition mentioned fruits and vegetables most often, but also respondents in the health and sustainable condition mentioned fruits and vegetables frequently. In addition, calories, dairy, vitamins and minerals, fibers and variety of food were often mentioned in the health condition. Calories were also mentioned frequently in the combined condition. Finally, respondents in the health, sustainable and combined conditions thought of natural production and pureness more often than those in the control condition.

A multivariate ANOVA shows that the main effect of experimental manipulation condition was not significant for any of the intentions. The main effect of segment was significant for intentions to consume sustainable products ($F(2817) = 72.27$, $p < 0.001$), intentions to consume regular meat ($F(2817) = 14.62$, $p < 0.001$) and intentions to consume vegetarian meals ($F(2817) = 21.08$, $p < 0.001$). Pro-selves intended to eat less sustainable products compared to average consumers, and conscious consumers intend to eat more. Conscious consumers also intended to eat more products that can replace meat in the meal than the other two segments. In addition, conscious consumers intended to eat meat less regularly (see Table 3). In addition, there was a significant interaction between the manipulation condition and segment for regular meat intentions ($F(6817) = 2.18$, $p = 0.043$). A subsequent one-way between-subjects ANOVA with post-hoc Tukey test per segment shows that for sustainable conscious consumers, intentions to consume regular types and portions of meat were significantly lower in the combined condition ($M = 4.01$) than in the control condition ($M = 4.89$) ($F(3456) = 3.89$, $p < 0.01$).

Table 3. Consumption intention (in number of days of the following week).

Cluster	Sustainable Products	Regular Meat	Regular Dairy	Vegetables and Regular Products	Meat Replacers, and Large Amounts of Vegetables and Meat
Pro-self consumers	0.68 [a, 1] (1.08)	4.36 [a] (1.83)	2.95 [a] (2.42)	4.45 [a] (1.67)	1.43 [a] (1.40)
Average consumers	1.31 [b] (1.58)	3.96 [a] (1.75)	2.99 [a] (2.16)	4.39 [a] (1.51)	1.55 [a] (1.40)
Conscious consumers	2.56 [c] (1.93)	3.38 [b] (1.99)	3.15 [a] (2.21)	4.25 [a] (1.58)	2.21 [b] (1.64)

[1] Different superscripts within one column indicate significantly different intentions following ANOVA post-hoc Tukey test at $p < 0.05$.

No significant differences were found in attitudes towards the food consumption guideline (to eat less animal-based and more plant-based diets) between conditions within the clusters. The only significant difference was that, overall, those in the combined condition scored higher than those in the healthy condition on the question whether the information that they had read made them think about the amount of animal-based and plant-based products that they ate.

4. Discussion

This study revealed the potential of targeting dietary messages to motive-based consumer segments. Segmentation may allow nutritional campaigns to reach specific audiences with the most effective message, tailored to their motivations. This study shows the importance of consumer segmentation, as well as the focus on the product-category level, in the development of effective dietary communication. Implications of the findings will be considered in more detail below.

This study has proposed to segment consumers based on food category specific motives. Three consumer segments have been identified: "pro-selves", "average consumers" and "sustainable conscious consumers". For the identification of the segments, this study used a domain-specific segmentation base. The identification of homogeneous subgroups was based on people's reasons and motivations behind their food choices instead of more general descriptive variables (e.g., socio-demographics) that are commonly used as segmentation base [71]. Food-related motivations are more closely related to behavior and are therefore preferred to more abstract variables in identifying segments [72]. The current study adds to the literature by considering food-category differences in domain-specific motivations (see also [47]) as well as the relation with effective dietary communication.

This study replicated and extended an earlier motive-based segmentation study [47]. The replication of the segmentation procedure almost three years after the initial study showed similar results, indicating the stability of the segments. Segment sizes slightly changed with an increase of just over ten percent of the sustainable conscious segment, mainly at the expense of the size of the average consumer segment. This finding looks promising, as it shows that the proportion of the population for whom sustainability attributes are relatively important has increased. The factor analysis also replicated the underlying factor structure of a pro-self factor (capturing taste, price and healthiness) and a sustainability factor (capturing a range of sustainability aspects such as animal welfare and environmental welfare) for each of the food categories (dairy, meat, fish and vegetables). This replication again underpins the significance of considering food category differences in attribute importance. In addition, this replication confirms that sustainability can be used as a container construct, because several sustainability aspects such as environmental aspects and animal welfare aspects loaded on one dimension.

The main added value of this study as compared to the previous study is twofold. First of all, the current study extends previous findings by gaining deeper insights into the segment profiles. The segments differed in food consumption, personal characteristics and food-related lifestyle aspects; elements which should be taken into consideration in the development of nutritional campaigns. Second, the current study provides insights into communication strategies towards the segments. Implications for the development of dietary communication will be discussed next.

The main aim of this study was to show how nutritional messages on healthy and sustainable diets should be tailored to different segments. The domain-specific lifestyle and personal characteristics of the three segments identified here imply some strategies for communicating dietary guidelines to each of the groups. The results show, however, that the same option—the strategy in which health and sustainability messages were combined—can best be used for all three segments. In other words, against our expectations, there was no strategy that showed to be significantly more effective than the health and sustainability condition in any of the segments. This is an unexpected result because we assumed that segments needed different communication strategies, adapted to their motivations. Apart from being unexpected, it is an interesting result. It shows that even those consumers who are less motivated to make healthy and sustainable food choices may benefit from information on healthy and sustainable diets. Although the information may not result in changing meal intentions, it makes them think more of sustainability and less of taste. This finding is in line with the literature, stating that the effectiveness of information campaigns on awareness is quite strong, but does not often result in behavior change [32–34,36]. In addition, based on our results, no negative effects are expected in any of the segments from communicating health and sustainability benefits of less animal-based and more plant-based diets.

Although we found that the most effective communication strategy is the same for all segments, results do indicate the relevance of motive-based consumer segmentation, as the effect of the communication on behavioral intentions differs across segments. A positive effect of the communication on sustainable dietary intentions has been found for sustainable conscious consumers only. The other two segments may need other issues addressed in their strategies to stimulate them to shift their diets towards more sustainable consumption levels or other pathways—next to providing

information—are needed in order for behavior change to occur in these segments. An option might be to consider the addition of pro-self motives in the formulation of and communication on dietary guidelines. In accordance with a flood of food studies, this study shows the importance of taste, price and convenience to food consumers. The lack of consideration of these attributes may be a reason why communication of dietary guidelines shows limited effectiveness in the real world. Synergies between pro-self short-term motives (e.g., price and taste), and healthy and sustainable choices should be communicated. An example could be the stimulation of seasonal fruit and vegetable consumption by emphasizing their low price and good taste, next to their possible health and sustainability gains.

However, the provision of information might also be insufficient. Literature shows that the effectiveness of information is limited, especially in terms of behavioral intentions, which is in line with our results. This research has focused on educational interventions adapted to the motivations of consumers. Results show that communicating the guideline only results in improved intentions for the segment that is already motivated. Agreement with the guideline does not differ across conditions within segments, indicating that communicating the guideline has no effect on agreement with it. Therefore, it is likely that for pro-self and average consumers, dietary communications that can increase knowledge or awareness will not result in behavior change. General agreement exists that knowledge is necessary but insufficient to change (health) behaviors [73]. Therefore, other pathways must be considered, such as marketing and legal interventions to help create the necessary motivation, ability and opportunity for behavior change [30]. Nudges or labelling could help to make the healthy and sustainable choice the easy choice and taxes, subsidies or prohibitions of certain products can create a supporting environment. A combination of different types of interventions is likely to be needed to achieve a sufficient level of motivation and ability and the right opportunity. This implies that several actors are needed to achieve a dietary shift. Actors communicating about dietary guidelines, such as governmental organizations, dieticians, retail and food industries should work together to communicate about nutritional guidelines in an effective and unambiguous way, combining health and sustainability arguments. In addition, supermarkets could use nudging and labelling strategies, governments could provide regulations and food industries could get involved in regulation and labeling, for example.

Our insights into personal characteristics of the segments can be used in developing effective strategies for each of the segments. It may be beneficial, for example, to make pro-self and average consumers more future oriented. This study has shown that pro-selves differ from sustainable conscious consumers on this aspect. In addition, messages can be adapted to the transition phase in which a consumer is positioned. For instance, in the pre-contemplation phase, it is important to raise consumers' awareness of health and sustainability problems. In the contemplation stage, one's self image is crucial and can be influenced by providing role models, for example. In the preparation stage, it is important to make consumers believe that they can change, for instance by providing a range of practical options. Consumers in the action and maintenance stage can be helped by prompting healthy and sustainable choices [31]. The finding that the segments differ in their transition stages suggests that different types of messages best fit these segments. Prompting health and sustainable choices, as has been done in this study by the provided information, best fits consumers in the maintenance stage. It is therefore not surprising that the effect on intentions was only found for the sustainable conscious consumers, the segment with the largest number of consumers in the maintenance stage.

The results underpin the importance to take product-category differences into account. First of all, the communication of the dietary guideline seems to have an effect on intentions, if only for the product-category of meat. The specific character of meat is also shown in a study about vegetarian diets [74], which showed that although these diets are generally perceived as positive, the consumption of such a diet is still hampered by health concerns, unwillingness to make dietary changes or enjoyment of eating meat.

Second, the factor analysis on intentions shows that consumption of regular portions and regular variants of meat, dairy and vegetables load on different underlying factors. This implies that the

guideline to consume less animal-based products might be too general. Motivational differences exist concerning meat and dairy, and it might be better not to lump these product categories together in the same message.

Furthermore, the results show that the effect of communicating the guideline is only found for the curtailment of meat, and not for the purchase of sustainably produced meat products (e.g., organic or animal friendly variants) [49]. This finding is not surprising, as the guideline is focused on curtailment behavior, and not on stimulating the purchase of sustainably produced products, but it shows that the effect does not lead to spillovers to other types of sustainable behavior. This implies that communication aimed at stimulating sustainably produced products may have additional beneficial effects on stimulating sustainable diets.

In short, we can conclude that it is not so much the nature of the message (healthiness and/or sustainability argument) that is key in differentiating between segments, but the relation between message, segment and product category. Those involved in communicating dietary guidelines could choose to use a mix of pro-self and pro-social arguments for all consumer segments, as including both types of arguments might appeal to a larger audience. The current study did not find any negative effects on either thoughts or meal intentions of a frame that combines health and sustainability in any of the segments. Therefore, we propose to place dietary guidelines in a context of both healthiness and sustainability, and to combine both health and sustainability arguments. In other words, sustainability should become part of the criteria on which dietary guidelines are formulated and communicated, like Lang and colleagues [9] already pled for in 2009. This study underpins the ongoing debates on the shift in focus of nutritional guidelines to include sustainability considerations.

Overall, the results imply that in the development of dietary messages:

- Product-category differences should be taken into account.
- Differences between motive-based segments should be taken into account.
- The type of sustainability that is targeted—curtailment versus sustainable products—should be taken into account.
- Communication strategies seem insufficient to shift diets, especially among pro-self and average consumers, and therefore additional strategies should be considered.

Although this research has some important implications, it also faces some limitations and raises some important issues for future research. First, the health manipulation did not result in more health thoughts. A possible explanation is that, at the baseline level (regardless of any communication), health is more salient in the consumer's mind than sustainability. Therefore, it is much harder (and maybe unnecessary) to increase health thoughts through communication. We do not perceive it as a problem that the health manipulation check did not show significant differences between conditions, because the open-ended question on association words show that the manipulation has been read and understood, because respondents mentioned health-related words (those in the health manipulation mention 'health' least often. This is a logical result of the way we framed the question, as we asked them to mention words that came to their mind when thinking of healthy food).

Future research should include a broader range of communication conditions to check the effect of combining short-term pro-self motives (e.g., taste, price and convenience) with long-term pro-social motives (sustainability) and/or long-term pro-self motives (health). All segments, specifically the pro-self segment, could be attracted with messages including those pro-self short-term motives. Such additional communication strategies may result in larger differences in effectiveness between segments. Furthermore, additional attribute combinations may give insights into whether a combination of two attributes is more effective than focusing on a single attribute. The current study is not conclusive on whether the health and sustainability condition shows the best results, because of the synergy of the two arguments or because of the fact that two arguments are included in this condition as compared to one argument in the other conditions. We did, however, keep the information comparable in length by shortening the length of both arguments in the combined condition, and therefore it is

most likely that the effect occurs because of synergy. Another argument to support this reasoning is that, from previous research [47], we know that sustainable conscious consumers perceive the most synergy and pro-selves perceive the least synergy between health and sustainability of food products. If the effect of the health and sustainability condition was due to the number of arguments, than the largest effect would be expected to occur for pro-selves, whereas if it were the synergy perception, the largest effect would be expected to occur for conscious consumers (which is the case). A final interesting direction for future research can be found in the spillover literature [75]. Based on the current study it can be concluded that the best communication strategy is to include a combination of health and sustainability arguments. It seems intuitive to persuade people that sustainable behavior is in their own interest, for example by stressing the health or price benefits that come along with certain sustainable behaviors. Previous research showed, however, that making self-interest motivations salient may counteract prosocial motivations and therefore it may prevent positive spillover from one prosocial behavior to other prosocial behaviors [75,76]. Future research should provide more insights into positive or negative spillover effects resulting from communication strategies.

5. Conclusions

This study puts forth a preliminary segmentation based on food-category specific food motivations that may help develop effective dietary communication strategies motivating consumers towards more healthy and sustainable diets. We can conclude that communicating both health and sustainability benefits of eating less animal-based and more plant-based products is advisable for all motive-based consumer segments. Effects on behavioral intention differ across motive-based segments and additional ways of stimulating sustainable food consumption beyond informing are needed, especially for pro-self and average consumers. The effectiveness of the communication in terms of sustainable food intentions not only depends on the segment, but also on the product category. Future research is needed to study the generalizability of the findings to other guidelines, in other food categories, with other product attributes and considering the entire diet, but this study leads to useful insights for those who are involved in communicating healthy and sustainable dietary guidelines. Thereby this study contributes to a more healthy and sustainable food consumption pattern.

Author Contributions: All authors conceived and designed the experiment together; Muriel C. D. Verain analysed the data and wrote the paper, which had then been checked and revised by all authors.

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Appendix A

The following manipulations have been used in the experiment (original Dutch text followed by the English translation).

Control condition:

Deze vragenlijst gaat over eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan uw totale voedselinname gedurende de hele dag. U kunt hierbij bijvoorbeeld denken aan wat voor soort producten u eet en hoeveel u ervan eet. Het eten van drie hoofdmaaltijden en (eventueel) een aantal tussendoortjes bepaalt uw voedselinname. Het gaat om hoe u uw maaltijden samenstelt.

English translation: This questionnaire focusses on food. With this we mean dietary behavior that contributes to your total food intake during the entire day. You could think of the type of products you eat and the amount you eat of it. The intake of three main meals and (potentially) a number of snacks determines your food intake. It entails the way you compose your meals.

Health condition:

Deze vragenlijst gaat over gezond eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan een goede gezondheid met een goede weerstand, weinig ziekte en een fit en energiek gevoel. U kunt hierbij bijvoorbeeld denken aan de verhouding dierlijke en plantaardige producten die u eet. Het eten van weinig dierlijke producten (zoals vlees en zuivel) en veel plantaardige producten (zoals groente) is gezond. Het gaat er om hoe gezond de maaltijden zijn die u samenstelt.

English translation: This questionnaire focusses on healthy eating. With this we mean dietary behavior that contributes to a good health with a good resistance, little illness and a fit and energetic feeling. You could think of the proportion of animal-based and plant-based products that you eat. The intake of few animal-based products (such as meat and dairy) and many plant-based products (such as vegetables) is healthy. It entails the healthiness of the meals you compose.

Sustainability condition:

Deze vragenlijst gaat over duurzaam eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan een duurzame wereld met respect voor het milieu, de dieren en de mensen om ons heen. U kunt hierbij bijvoorbeeld denken aan de verhouding dierlijke en plantaardige producten die u eet. Het eten van weinig dierlijke producten (zoals vlees en zuivel) en veel plantaardige producten (zoals groente) is duurzaam. Het gaat er om hoe duurzaam de maaltijden zijn die u samenstelt.

English translation: This questionnaire focusses on sustainable eating. With this we mean dietary behavior that constitutes to a sustainable world, with respect for the environment, the animals and the people surrounding us. You could think of the proportion of animal-based and plant-based products that you eat. The intake of few animal-based products (such as meat and dairy) and many plant-based products (such as vegetables) is sustainable. It entails the sustainability of the meals you compose.

Combined condition:

Deze vragenlijst gaat over gezond en tegelijk duurzaam eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan een goede gezondheid en een duurzame wereld met respect voor het milieu, de dieren en de mensen om ons heen. U kunt hierbij bijvoorbeeld denken aan de verhouding dierlijke en plantaardige producten die u eet. Het eten van weinig dierlijke producten (zoals vlees en zuivel) en veel plantaardige producten (zoals groente) is gezond én duurzaam. Het gaat er om hoe gezond en duurzaam de maaltijden zijn die u samenstelt.

English translation: This questionnaire focusses on healthy and simultaneously sustainable eating. With this we mean dietary behavior that contributes to a good health and a sustainable world, with respect for the environment, the animals and the people surrounding us. You could think of the proportion of animal-based and plant-based products that you eat. The intake of few animal-based products (such as meat and dairy) and many plant-based products (such as vegetables) is healthy AND sustainable. It entails the healthiness and sustainability of the meals you compose.

Appendix B

Table A1. Number of times words in certain categories were mentioned in the four conditions.

	Control	Health	Sustainable	Health & Sustainable	F-Value
Tasty	140 [a]	13 [b]	10 [b]	13 [b]	287.961 ***
Fruit and vegetables	70 [a]	263 [b]	30 [c]	86 [a]	327.226 ***
Healthy	47 [a]	5 [b]	40 [a,c]	21 [c]	38.152 ***
Meat	43 [a]	21 [b]	7 [c]	4 [c]	50.929 ***
Sociable	37 [a]	0 [b]	1 [b]	0 [b]	105.974 ***
Bread	34 [a]	11 [b]	1 [c]	6 [b,c]	49.080 ***

Table A1. *Cont.*

	Control	Health	Sustainable	Health & Sustainable	F-Value
Cooking	28 [a]	0 [b]	0 [b]	0 [b]	83.627 ***
Potatoes	27 [a]	3 [b]	5 [b]	2 [b]	45.647 ***
Good	25 [a]	3 [b]	6 [b]	7 [b]	28.938 ***
Calories	24 [a]	86 [b]	4 [c]	27 [a]	112.505 ***
Pasta	18 [a]	1 [b]	1 [b]	0 [b]	44.874 ***
Hungry	15 [a]	0 [b]	0 [b]	1 [b]	40.187 ***
Fish	13 [a]	18 [a]	9 [a]	9 [a]	4.686
Grocery shopping	12 [a]	0 [b]	0 [b]	0 [b]	35.701 ***
Dairy	11 [a,b,c]	25 [c]	2 [b]	13 [a,c]	21.948 ***
Rice	10 [a]	1 [b]	0 [b]	0 [b]	25.494 ***
Nutritious	8 [a]	2 [a]	2 [a]	1 [a]	9.327 *
Variety	6 [a,b]	16 [b]	0 [a]	1 [a]	28.553 ***
Vitamins & minerals	5 [a,b]	21 [c]	1 [b]	10 [a,c]	25.140 ***
Fresh	4 [a]	20 [b]	1 [a]	23 [b]	32.042 ***
Expensive	3 [a]	8 [a]	29 [b]	26 [b]	30.672 ***
Organic	2 [a]	29 [b]	73 [c]	81 [c]	94.831 ***
Vegetarian	2 [a]	1 [a]	6 [a,b]	13 [b]	16.517 **
Natural	1 [a]	5 [a]	2 [a]	4 [a]	3.473
Water	1 [a,b]	8 [b]	0 [a]	3 [a,b]	12.968 **
Animal friendly	1 [a]	1 [a]	21 [b]	14 [b]	31.975 ***
Nutrition guideline	1 [a,b]	9 [b]	0 [a]	1 [a,b]	19.558 ***
Wasting	1 [a,b]	0 [b]	9 [a]	1 [a,b]	18.847 ***
Regional	1 [a]	0 [a]	14 [b]	15 [b]	26.444 ***
Fiber	1 [a]	20 [b]	0 [a]	3 [a]	45.343 ***
No additives	1 [a]	7 [a]	7 [a]	6 [a]	4.792
Environmentally friendly	0 [a]	0 [a]	27 [b]	19 [b]	48.839 ***
Fair Trade	0 [a]	0 [a]	23 [b]	21 [b]	44.464 ***
Natural production	0 [a]	7 [b]	13 [b]	20 [b]	22.287 ***
Ecological	0 [a]	2 [a,b]	11 [b]	11 [b]	17.063 **
Seasonal	0 [a]	3 [a,b]	11 [b]	9 [b]	13.668 **
Pure	0 [a]	8 [b]	4 [a,b]	8 [b]	9.083 *
Responsible	0 [a]	0 [a,b]	7 [b]	6 [a,b]	13.119 *
Don't know	0 [a]	3 [a]	30 [b]	23 [b]	46.928 ***

[1] Control includes 1045 words, health includes 1025 words, sustainable includes 1050 words and health & sustainable includes 1025 words. [2] Different superscripts within one row indicate significant differences following ANOVA post-hoc Tukey test at $p < 0.05$. [3] * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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