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Full Research Paper

Compare with Vices or Virtues? The Effect of Comparison Object Type on Consumer Purchase Intention to Low-Calorie Products

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Abstract: Low-calorie products are increasingly popular with consumers. To demonstrate the low calorie advantages, companies often advertise “product calorie lower than an apple” or “lower than a banana”. Current research argues that when the calorie counts of comparison objects is fixed, comparison with vices（vs. virtues）can increase consumer purchase intention to the low-calorie products. This is because consumers categorize low-calorie products as virtues based on the heuristic belief that "healthy = low-calorie". So we expect consumer will perceive more calorie discrepancy when compared with vices, which resulting in lower calorie estimation and higher purchase intention. Currently through two study, we verified the main effect and found this effect is mediated by calorie perceived discrepancy. Our research has strong practical implications. We found a better way to promote the low-calorie food. It also shows that currently some corporate practices (informing products calorie content when comparing) may be inappropriate.

Keywords: Low-calorie products, vices, virtues, calorie perceived discrepancy

1. INTRODUCTION

With the increase of per capita income and the awakening of public health awareness, people's requirements for food are no longer just to satisfy their appetite, so “high-sugar, high-calorie” products can no longer meet people's needs, and eating “healthily” has become a new pursuit for more and more consumers. In order to meet the needs of different market segments, businesses have launched many “functional” snacks for different groups. For example, "low-calorie" products are launched for people who lose weight, "milk substitute" products for people with lactose intolerance, and "sugar-free or low-sugar" foods for people with sugar control. In short, there are so many low-calorie products on the market right now and low-calorie label is one of its important advantages. How to skillfully display product information and highlight the advantage of low- calorie has become a concerned issue for marketers.

For most consumers who need to control their weight and keep fit, knowing foods caloric content become paramount. In order to deliver calorie information more clearly, companies are very fond of highlighting products low calorie characteristics through comparison. For example, a low-calorie cookie, marketers will emphasize that its calories are less than the calories of an apple. Almost all marketers use “apple” as a comparison object in their ads. Which makes us wonder, is this the best marketing method at all times? The current research posits that the promotion of light calorie snacks using appeals that highlight lower calorie than apples, although popular and perhaps intuitive among marketers, is not always the best comparison. Namely, when the calorie count of the comparison object is fixed, vices with the same calorie is a better comparison object than virtues, and can play a better marketing effect. This is because low-calories products are often classified as virtues. Then when compared to the difference category vice food, consumers will perceive more calorie discrepancy, which resulting in higher purchase intentions.

Since reducing calorie intake is key to tackling obesity, previous research about calorie focused on the effect of calorie count labeling on scheduled and final calorie intake [1]. Actually, the way that consumers

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process information is diverse. Consumers know the pros and cons of products through comparison. That is to say, consumers will make a value judgment of a commodity based on certain comparison objects [2]. But little attention has been paid to the fact that calorie perception is subjective and that calorie estimation is susceptible to differences in comparison objects. We found that a lot of marketers are trying to highlight the fact that new products have fewer calories by comparing them to virtues products (e.g. apples), trying to convey the idea that light foods with fewer calories are healthier and worth buying. But can the calorie comparisons of target products with virtues really increase consumers' willingness to buy? When the calorie comparison between the target product and the vices is carried out, can it cause a greater calorie perceived discrepancy, and then think that the target product has lower calorie and is more worth buying? In response to these research gap, we will carry out a series of studies to explore the internal mechanism of consumers' calorie information processing. The purpose of this paper is to investigate the effect of the comparison objects type (vices vs. virtues) on low-calorie product evaluation and purchase intention. Whether the type of comparison objects will influence the calorie perceived discrepancy which resulting purchase intention to low-calorie products be enhanced or weakened? This paper also explores one boundary condition: the presence of calorie counts label.

Our research contributes to the literature in three ways. First, we clearly suggest that caloric comparison with indulgent products is more likely to increase consumers' purchase intention for low-calorie products, rather than for self-regulated products such as Apple. Second, this study provides a valuable contribution to the larger body of research on magnitude and subjective valuation by proposing a novel factor that influences the magnitude sensitivity and the concavity of the value functions: the type of calorie comparison objects (vices vs. virtues). Third, this study demonstrates that the type of comparison objects(vices vs. virtues) affects purchase intention to the low-calorie products mainly by influencing individuals' perceived discrepancy; that is, vice as comparison object increase individual' calorie perceived discrepancy more than virtue as comparison object does.

2. THEORETICAL FRAMEWORK

2.1 Different comparison objects: vices vs. virtues

Comparison is a common method used by companies when marketing low-calorie products. For example, when it is emphasized that food contains high protein, the company will compare the nutrient content of the product with that of milk. When expressing calorie information, company will compare it with "calorie-equivalent exercise data" [3], which represents the amount of exercise required to burn off the calorie content of the food. In addition, when highlighting a product's low-calorie message, businesses usually compare the calorie content of a product with apple.

But we don't think this is the best way to compare. We proposed that comparative information conveys the magnitude difference in calories, and such difference can be expressed by comparison with vices or virtues. In the food field, people usually classify food according to the dichotomy of vices and virtues [4]. Virtues are generally defined as choices that are consistent with long-term self-control goals (e.g., weight loss) but do not necessarily provide immediate gratification. In contrast, vices are defined as choices that were consistent with short-term goals (e.g., eating chocolate cake) but inconsistent with long-term self-control goals (e.g., losing weight). Vegetables and fruits are often considered inherently healthy and thus are classified as virtues. In contrast, "indulgent" foods (e.g., chocolate, burgers) are considered inherently unhealthy and thus are classified as vices. For simplicity, in this research, we treat the vice/virtue descriptors as a binary attribute; in reality, these could be considered endpoints of a continuum characterizing the degree of "virtuousness" and "viceness" of an option.

Existing researches have shown that when individuals face the same decision-making problem, they will

make completely different choices because of different reference objects. For example, in advertising, reference can be used to influence the reference price that people use when constructing a comparison standard, thereby affecting the perception of cost (e.g., "Our new product only needs the price of a cup of coffee..."). We believe that when making calorie comparisons, different comparison objects also serve as different reference points, which affect consumers' calorie perceived discrepancy. We thus formally propose the following hypotheses:

H1. Vice as comparison object increase individual' calorie perceived discrepancy more than virtue as comparison object does.

2.2 Calorie comparison objects and purchase intention to low-calorie products

According to the consumer satisfaction theory, consumer satisfaction or not and the level of satisfaction always depends on the comparison of actual and expected performance results. Similarly, consumers' understanding of the advantages and disadvantages of some attributes of a commodity should also be generated through comparison. That is to say, consumers will make a value judgment of a commodity based on certain comparison objects. Consumers can not only refer to the attribute of other similar goods but also refer to the lowest personal psychological standards of this attribute. But we know that calorie is a very specialized attribute. The average consumer has no idea about how much calorie they should intake per day and how to make a food calorie count [5]. Specifically, the same 100 calories, for different individuals there are different magnitude of calorie estimation. Some people think 100 calories is high and some people think 100 calories is low. In other words, when consumers need to estimate the calorie of the target food, it is difficult to make a quick and accurate judgment based on their limited cognition of calorie and the lack of knowledge. So consumers always rely on some information related to the caloric assessment task to make a caloric judgment. Because of this, the form of information presented can have an impact on consumers' calorie assessment.

Consumers have different degrees of calorie perception for virtue products and vice products. Compared with vice products, consumers generally believe that virtue products have lower calories, and eating more virtue food can reduce calorie intake [6]. Even though the nutritional fact labels are mandatory for packaged food, calorie information is not always available for food. Consumers tend to use food-related cues to infer calories. In other words, consumers always perceive the magnitude of food calorie instead of make an accurate numeric estimation (except for some fitness people).

Consumers always make a caloric estimation of target food based on the calorie perception of some familiar food. Product promotion in the real scene will highlight the low-calorie advantage of the target product by comparing it with other types of products about the magnitude of calorie. Type and quantity are two key properties of target food. When estimating calories, type is considered primary as it is evaluated more quickly and automatically than quantity [7]. Consumers quickly categorize the type of food, for example, by making a judgment about whether the food is healthy or unhealthy. Meanwhile, research shows that when consumers are motivated to arrive at a conclusion (e.g., estimate the food have fewer calorie), they are likely to rely on heuristics that help them arrive at the desired conclusion and ignore those that suggest otherwise. Consumers tend to use food-related cues to infer calories. One commonly used heuristic is perceived healthiness of food. Specifically, healthy food is perceived to be low in calories, and unhealthy food high in calories. Given the "healthy = low-calorie" heuristic, we expect consumers to rely on this heuristic in calorie estimation and estimate fewer calories.

Virtues are often associated with healthy nature because virtue food provide consumers with longer long-term and more self-beneficial satisfaction. According to the "healthy = low-calorie" heuristic information processing, when the calorie level of the target food were compared with those of the virtues, consumers are likely to have a lower perceived calorie of target food. According to the category theory [8], when the low-calorie attribute of the target food is emphasized, consumers will reclassify the target food category based on whether it

is healthy or not, so as to facilitate the calorie estimation. Previous research have shown that people are more likely to underestimate the caloric content of main dishes and to choose higher-calorie side dishes, drinks, or desserts when fast-food restaurants have a healthy halos. Target foods that reduce their total calorie content through certain technologies are generally perceived by consumers as healthier than more general snacks and drinks [9].

When the virtues and the target food are classified as the same category with healthy nature, people always think the target food and the comparison objects have less calorie perceived discrepancy. This is because consumers often infer similarity from category membership even when it is not accurate to do so. Two things are judged to be more dissimilar when they belong to different categories compared to the same category [8]. For example, consumers estimate two locations in different states to be further apart than equidistant locations in the same state, and the same people are judged to be more different when they are members of different groups rather than the same group. Even colors appear more or less similar depending on whether one' s language puts them in the same category or different ones. Therefore, when low-calorie products are classified as virtues, they will think the target food and the comparison objects have less calorie perceived discrepancy.

Consumers are likely to estimate more calories when inferring the calorie count of the target food. We know that low-calorie foods on the market today tend to cost more than general foods with higher calorie. Only when consumers receive and fully understand the low-calorie information, they will have a higher evaluation of the product value, and thus are more willing to pay more for target food. We thus formally propose the following hypotheses:

H2: The calorie comparison between low-calorie products and vices products (vs virtues products) leads to more positive evaluation and purchase intention to the low-calorie products.

2.3 The moderating role of the presence of calorie counts label

We know that reducing daily calorie intake is one way to control weight, and estimating total daily calorie intake by self-measuring the calorie content of foods consumed is a potentially effective strategy for weight loss. Calorie counts on restaurant menus have been advocated in the early days of Europe and the United States [10]. However, there is controversy over whether providing calorie counts actually reduces an individual's total calorie intake. One study assessed whether labeling restaurant menus with information on the nutrient content of menu items would cause customers to alter their ordering patterns. The results have shown that not all customers choose to order fewer calories, but providing nutrition information on restaurant menus may encourage a subset of restaurant patrons to significantly alter their food choices. The subject of previous research about the presentation of calorie information across multiple Disciplines is whether calorie counts reduce calories ordered and, if so, by how much. Across multiple disciplines has found little effect of providing calorie counts on calories ordered. The literature has commonly proposed that calorie labels on menus are ineffective because consumers lack the knowledge and/or motivation to use calorie information to make lower calorie food choices. However, the effect of calorie count labels on calorie ordered is related to how the information is presented to consumers. When making food choices, consumers attach different importance to food information and pay attention to it in different order. Most of the time, multiple attributes about food are presented to consumers (e.g. product name, ingredients, nutrients, calorie count, product type, origin). With a large amount of product information and limited individual cognitive load, consumers often ignore a lot of product information. One study shows that for American consumers, display calorie counts to the left of food items decreased calories ordered by 16.31% Because Americans read from left-to-right, which lead to the neglection of calorie information [11].

In most advertisements of low-calorie products, marketers always convey the food advantage of "low calorie intake" to consumers in various ways, so that consumers feel the value of the product and are willing to

pay a premium for it. But having a good understanding of calories or making a clear judgment about calorie intake requires a lot of cognitive ability and expertise. A large number of studies have shown that most consumers' evaluation of calories is biased, such as "averaging bias" [12] According to cognitive theory, the information we are exposed to every day is not only huge, but also chaotic. Only after sorting and classification can we form a clear and orderly understanding and make our own judgment. For consumers, when faced with the product information that requires their professional knowledge, such as calories and nutritional ingredients, consumers are more likely to evaluate the information based on subjective perception rather than making rational judgment through accurate calculation or wealthy expertise about nutrition [13]. It is a typical way to process product information with comparison objects. The properties and the calorie counts of the comparison object can help consumers to perceive the caloric level of the target food more deeply. When consumers can identify the calorie discrepancy between the target product and the comparison product through simple calculation of calorie counts, the sensitivity to product value will be weakened or even disappear. We thus formally propose the following hypotheses:

H4: when the calorie counts of target product are available for consumer, the main effect of comparison objects type on low-calorie products purchase intention will be weaken and the calorie perceived discrepancy will disappear

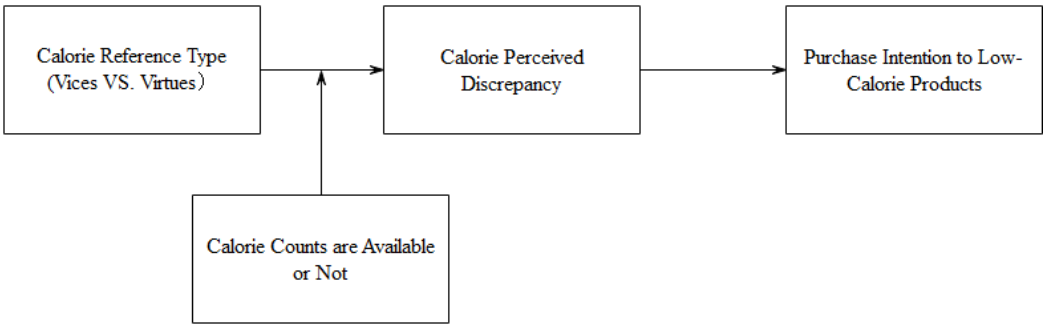

Figure 1. Conceptual Framework

3. STUDY1 THE IMPACT OF COMPARISON OBJECTS CATEGORY ON LOW-CALORI E PRODUCTS PREFERENCE

Study1 tested H1, the basic proposition on the effect of comparison object on consumers' purchase intention to low-calorie snacks. One hundred and forty participants joined the online study. We eliminated the data from ten participants who failed attention test. Thus, the final valid sample of this study was 130 participants (92 females, M_{age} = 28.72).

3.1 Method

Participants were randomly assigned to one of two (vices vs. virtues) between-subjects conditions. We selected a new low-calorie potato chip, "Xiaolingyou", as the experimental material, and told all participants that "this is a delicious, low-calorie snack with no added fat, non-fried and light burden". Then two group participants were shown two different advertisements.The vice group was shown that a pack of snacks has fewer calories than an apple and an apple has 118 calories (a true calorie count of 100 grams of apple). The vice group saw the calorie comparison between Xiaolingyou and chocolate, and also told participants that the calorie of chocolate was 118 kcal1. Immediately after reading the experimental materials, participants were asked to estimate Xiaolingyou's calorie in a range of 0 to 118Kcal. Then participants score two items, "I'd love to try Xiaolingyou" and "I am willing to buy Xiaolingyou", which measure consumer' purchase intention with a 7-point scale (1 = strongly disagree, 7 = strongly agree). Next, they were asked to rate their caloric perceived discrepancy along an item "I think there is a big difference between the calories of Xiaolingyou and an apple/a

piece of chocolate". Considering that different comparison objects may not only affect participants' calorie evaluation, but also affect health and deliciousness perception. We measured participants' ratings of how healthy and delicious snacks, apples, and chocolate were. Finally, we asked whether participants had a weight/fat loss plan recently, their usual level of attention to calorie information, and other demographic variables.

3.2 Results

Health and deliciousness. A one-way ANOVA confirmed that the two groups did not differ in their evaluations of health and deliciousness of Xiaolingyou (Health: $M_{virtue} = 5.06$, $SD_{virtue} = 1.021$; $M_{vice} = 5.06$, , $SD_{vice} = 1.193$; $F(1,128) = 0.000$, $p = 0.992$； Deliciousness: $M_{virtue} = 5.42$,$SD_{virtue}=1.151$; $M_{vice} = 5.38$, $SD_{vice} = 1.315$; $F(1,128) =0.052$, $p = 0.821$). In addition, participants rated apples as healthier than chocolate, with no difference in taste((Health: $M_{virtue} = 6.47$, $SD_{virtue}=0.661$； $M_{vice} = 3.81$, $SD_{vice} = 1.390$； $F(1,128) =192.523$, $p < 0.000$; Deliciousness: $M_{virtue} = 5.71$, $SD_{virtue}=1.200$； $M_{vice} = 5.47$, $SD_{vice} = 1.333$； $F(1,128) =1.199$, $p = 0.276$).

Perceived discrepancy and purchase intention. A one-way ANOVA results showed that perceived discrepancy in the virtue group were lower than those in the vice group($M_{virtue} = 4.14$, $SD_{virtue} = 1.239$； $M_{vice} = 5.03$, $SD_{vice} = 1.333$ ； $F(1,128) = 15.732$, $p < 0.000$). In addition, another one-way ANOVA results showed that the calorie estimates of Xiaolingyou in the virtue group were lower than those in the vice group($M_{virtue} = 78.45$, $SD_{virtue} = 25.304$； $M_{vice} = 69.81$, $SD_{vice} = 24.994$； $F(1,128) = 3.836$, $p = .052$),which means when the comparison object is vices, participants estimates lower calorie of the product. As expected, a one-way (exclusion vs. inclusion) ANOVA showed that vice group participants reported higher purchase intention than virtual group ($M_{virtue} = 5.61$, $SD_{virtue} = 1.135$； $M_{vice} = 5.94$, $SD_{vice} = 0.906$； $F(1,128) = 3.372$, $p = .069$).

Mediation analysis. We conducted a mediation analysis with purchase intention as the dependent variable. We regressed comparison objects on purchase intention, with calorie discrepancy as the mediator. Hayes's (2015) PROCESS Model 4 (5,000 bootstrap) analysis returned an almost significant index of mediation (95% CI (-0.0292, 0.2253). The mediation result is close to not including 0, may be that the result of DV is not significant enough. Although not quite there, we think this result is acceptable.

3.3 Discussion

Through study 1, we found that different comparison objects do affect consumers' purchase intention. When the comparison object is vices (vs. virtues), consumers estimate lower calories of the product and express higher purchase intention. This preliminarily verified the main effect. Study 1 also confirmed our proposed mechanism by showing that participants in vice group perceived greater discrepancy in calories than virtue group. In addition, we excluded the effect of comparison objects on the health and taste of the product. Next, we will further explore the moderating role of product calorie information in study 2, and select different main products and comparison objects to repeatedly verify the main effect.

4. STUDY2 MODERATING ROLE OF CALERIO CONTENT LABEL

Study 2 is to verify the moderating effect of product calorie information, and at the same time to verify the main effect again. We believe that when informing product calorie information, participants do not need to rely on comparison object to infer the calorie content of the product, but due to the reference role of comparison object, consumers perceive lower calorie values when compared with virtues.204 participants joined the online study We eliminated the data from 5 participants who failed attention test . Thus, the final valid sample of this study was 198 participants (134females, $M_{age} = 28.35$).

4.1 Method

Participants were randomly assigned to conditions in a 2(comparison objects: vice vs. virtue) x 2 (Whether to inform product calorie information: inform vs. not inform) between-subjects design. This time we chose a low-calorie milk tea "Yanzhi" as the experimental material and same as study1,we told all participants that "This

is a delicious and low-calorie drink, low-sugar, low-fat and light burden". Following this, the participants were shown the ad either compare with an apple (virtue condition) or Coke (vice condition) and label apple or cola as 126 calories. Alongside the manipulation of comparison objects, Participants either completed the material reading or saw another picture with the product's calorie information (see Appendix). After seeing the ad, participants were asked to similar questions in study1.First, participants were asked to estimate Yanzhi's calorie in a range of 0 to 126Kcal. Then participants score two items, "I'd love to try Yanzhi" and "I am willing to buy Yanzhi", which measure consumer' purchase intention with a 7-point scale (1 = strongly disagree, 7 = strongly agree).Different from Study 1, here we measured one more item, they were asked to rate how high they think 126Kcal is (1=very low; 7=very high). Next, they were asked to rate their caloric perceived discrepancy along an item "I think there is a big difference between the calories of Yanzhi and an apple/a bottle of Coke". We measured participants' ratings of how healthy and delicious snacks, apples, and Coke were. Finally, the same demographic variables were measured as study1.

4.2 Results

Purchase intention. In fact, we found marginally significant product calorie information × comparison object interaction on customer purchase intention ($F(1, 194)=3.104$, $p=0.080$). But the results were not consistent with our expectations.

A simple effects test revealed that participants in the inform product calorie information condition were less likely to purchase when the comparison object was Coke ($M_{vice}=5.60$) versus when it was apple ($M_{virtue}=6.02$; $F(1, 94)=4.568$, $p=.035$). The results of how high they think 126Kcal is(1=very low; 7=very high) shows that, in the virtue condition, 126Kcal represents lower calorie($M_{virtue} = 3.74$), while the vice condition is the opposite($M_{vice} = 5.17$;$F(1,94) = 27.838$,$p < 0.000$).Due to different comparison objects, although participants in the two conditions know that Yanzhi's calorie is 109Kcal, they have different perceptions of the calorie level represented by this value, resulting in different purchase intentions, which is consistent with our expectations.

In not informed product calorie information condition, there was no significant difference in purchase intention between virtue and vice condition ($M_{virtue} = 6.00$; $M_{vice} = 6.02$; $F(1,100) = 0.015$,$p = 0.903$), that is, the main effect was not significant. However, by analyzing the data for the calorie estimation item, we found that different comparison objects still caused calorie perceived discrepancy ($M_{virtue} = 4.38$; $M_{vice} = 5.19$; $F(1,100) =13.803$,$p < 0.000$).Figure 2 presents an illustration of means.

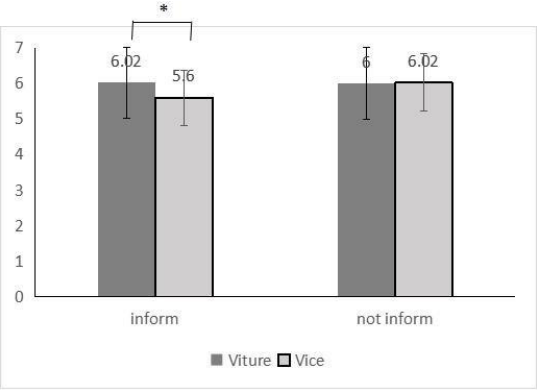

Figure 2. The effect of product calorie information and comparison objects on purchase intention

4.3 Discussion

The results of study 2 did not fully meet expectations, we think it is because inappropriate selection of experimental materials. We chose a new light milk tea from HEYTEA and changed its name. In fact, this milk tea is very popular in the market. So participants may know this milk tea and rate purchase intentions based on its popularity or previous experience. This interferes with our experimental results. Different comparison object

do contribute to consumer calorie perceived discrepancy.

5. CONCLUSION AND FUTURE PLAN

Low-calorie foods are gaining in popularity, and to show their products are low in calories, companies often advertise “lower than an apple” or “lower than a banana.” In public perception, apples, bananas, etc. are all virtue food which is low-calorie and healthy, and such advertisements can effectively attract consumers' attention. Current research argues that when the calorie of comparison object is fixed, compared with vices with the same calorie is a better comparison object than virtues. So far, two experiments have been completed in this paper. In Study 1, we manipulate comparison object and find that customers display higher purchase intention when the comparison object is vice versus when it is virtue (consistent with H1a).In addition, this study provides evidence that this effect is driven by calorie perceived discrepancy (H2).Due to the choice of experimental materials, the results of Study 2 did not meet expectations. Therefore we plan to have the following improvements in the follow study. First, we will re-select experimental materials, and avoid products that consumers already use. Second, In addition to product calorie information, we believe there are other moderating variables. Females are more conscientious than are males about their own diets and health, consume more healthful foods, and rate such foods as tastier. Kaitlin [7] proposed that how consumers estimate calories can systematically bias their calorie assessments. Magnitude estimates— when consumers judge whether something has “very few” to “many” calories — and numeric estimates — when consumers estimate a number of calories. We believe that Women pay more attention to caloric information than men, and are more likely to use deliberative thinking, so gender may be one of the moderating variables. In addition, we think the consumer's own professional knowledge of calorie information may also be one of the moderating variables.

Although our research is not yet complete, we will continue to improve it in the future. While conducting this research, we find many interesting conclusions that may not be recognized by marketers today. For example, a large number of advertisements will give calorie content of the product when comparing, but according to our logic, this approach may be wrong. When conducting the experimental design, we found that due to the smaller portion, many vice food are actually much lower in calories than the virtues, so we proposed vice products with the same calorie can be practiced. Our findings also suggest that it’s not that blindly comparing with low-calorie products can achieve better marketing effects. Possibly it is more important for marketers to let consumers perceive a greater calorie discrepancy.

6. APPENDIX

Study 2 Experimental Materials

Inform calorie information & virtue condition

Inform calorie information & vice condition

Not inform calorie information & virtue condition

Not inform calorie information & vice condition

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