

Consumer Decisions under Calorie Estimation: Review, Application and Prospects

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Abstract: Calorie estimation has a significant impact on consumer decisions regarding food choices. This paper provides a systematic review of research findings on calorie estimation in marketing, categorizes calorie estimation modes into magnitude-numeric mode and health-heuristic mode. It further distinguishes between two dimensions of cognitive and behavioural intentions to illustrate psychological mechanisms. In practice, it describes existing marketing strategies in the context of influencing factors. The main contributions are: Firstly, this paper expands the application of the theory in marketing by emphasizing the importance of self-monitoring and advocating healthy and sustainable marketing. Secondly, this paper provides feasible directions for future research, to explore effective methods for the integrated assessment of different calorie estimation modes, and to explore consumption behaviors between indulgent and abstinent consumers.

Keywords: Calorie Estimation; Estimation Modes; Averaging Bias; Self-Monitoring; Health Marketing

Introduction

In the context of serious obesity problems, consumers are inclined to choose low-calorie foods for fat loss. However, consumers' calorie estimates are often biased due to many factors. Due to misjudging the calorie content, consumers probably believe that consuming more food is in line with the expected calorie standard, thus defeating the purpose of healthy eating. From the marketing perspective, effective marketing can help achieve selling objectives by guiding consumers to adopt specific calorie estimation modes while avoiding deliberate misinformation. Therefore, the understanding of the consumer psychological mechanisms and various influencing factors in calorie estimation will be instructive in marketing area.

1. Common calorie estimation modes

Calorie estimation modes are summarized as magnitude-numeric estimation mode and health-heuristic estimation mode. Choosing magnitude or numeric mode as one approach to calorie estimation depends on the consumer's sensitivity and processing priority to food type and quantity information^[1]. If a magnitude mode is chosen, it suggests a focus on type information, favouring a 'high-low calorie' food classification using categorical thinking. If a numeric mode is chosen, it suggests a comprehensive consideration of both type and quantity information, favouring sophisticated estimates based on size, composition and other complex factors. Although numeric estimation is relatively accurate in theory, it is professionally demanding to use in practice.

Another approach is health-heuristic estimation mode, which relies on the consumers' rapid first response to food information. Consumers use the visual cues provided by food to make associations and thus estimate calories based on their perception of the overall health properties of the food^[2]. Because it is easier to process taste information that matches expectations than objective nutritional information, health heuristic estimation mode are widely used^[3]. In terms of use contexts, consumers prefer to use this mode in situations where time is limited. However, due to the over-reliance on the judgement of 'healthy or unhealthy', it is easy to misjudge foods such as bananas, which have a reputation for being healthy but are actually not low in calories. Therefore, in practice, it is needed to avoid over-reliance on intuition, which may lead to biased estimates.

2. Consumer psychological mechanisms

There are psychological mechanisms involved in the choice of a specific calorie estimation modes, divided into two dimensions: cognitive and behavioural intention.

As for cognitive dimension, motivational tendency are proposed, which refers to the tendency of consumers to adopt a

speculative approach to calorie estimation based on their own motivations, especially when faced with the temptation of unhealthy foods to underestimate calories^[4]. When consumers make an informative assessment, if there is a potential link between desired food characteristics and indirect environmental cues, consumers will rely on that link completely, even ignoring objective nutritional information, to facilitate their personal preferences^[5]. As for behavioural-intention dimension, even with biased estimation results, consumers can still use self-monitoring with specific indicators to track dietary intake^[6].

3. Existing marketing strategies

3.1 Presenting calorie information

The effective presentation of calorie information is essential, and the absence of this information has a negative impact on consumers' food choice. Consumers are rarely exposed to complete calorie information, and with low levels of overall calorie awareness, tend to rely on intuition or inaccurate nutritional information to track calorie intake^[1]. Therefore, changing the way calorie information is presented in marketing plays a key role in determining the effectiveness of message delivery. Firstly, calorie information can be structured so that health-related trade-offs are more prominent, for example, by placing foods in order of calorie content or giving the highest and lowest calorie foods in a range as a reference. Secondly, In a continuous food selection scenario such as a restaurant, cumulative calorie totals rather than individual food calorie content can be provided^[7]. All of information presentation methods have been shown to reduce cognitive costs and correct for estimation bias.

3.2 Providing bundle option

The combination of healthy and unhealthy foods as a bundle makes consumers underestimate calories. When unhealthy food is in the bundle, hedonism often comes at the expense of long-term health goals, thus exacerbating psychological conflict. At this point, consumers tend to look for reasons to indulge to minimize guilt^[1]. Since the healthy food in the bundle is consistent with the long-term health goals, consumers will focus on healthy food when evaluating bundles^[8]. Based on the "healthy-equals-low-calorie" heuristic, the calorie estimation for bundle will be lower than for the unhealthy foods alone. Therefore, consumers effectively reconcile the conflict between health goal and indulgent consumption, guilt and other negative emotions are reduced, and indulgent consumption is temporarily allowed. When bundled options are offered, consumers have a higher willingness to purchase the bundle rather than the unhealthy product alone, leading to consuming more calories. Merchants needs to ration healthy and unhealthy foods in bundle (e.g. 30% French fries and 70% salad) to achieve the goal of both promoting sales and ensuring calorie intake kept within appropriate limits.

3.3 Using market cues

More explicit marketing cues such as packaging, labelling and other information have an effect on calorie estimation. Regarding labelling, consumers consume fewer calories when food is labelled with the daily calorie requirement, or the percentage of ingredients^[5]. Regarding packaging, its visual cues can be used as health cues (e.g., color, picture) in caloric estimation^[8]. However, since packaging contains much information including brand name, celebrity endorsement, and special offers, consumers may find it difficult to notice health information, which may easily lead to biased judgment of neglecting health. There is a need to leverage the positive influence of marketing cues on consumers in marketing to reduce calorie estimation bias and guide them to make healthier food choices.

4. Further marketing applications

4.1 Healthy marketing

Merchants can use market information to guide consumers in food choices. Optimising the nutritional labelling and packaging of food products can encourage healthy food choices, for example, through visually presented health claims labels or green food packaging. However, it is important to note that labelling products as 'organic' may cause consumers to underestimate calories and discourage their health claims. Therefore, businesses need to define healthy food in a responsible way. In addition to food packaging design, it is also recommended that restaurants provide more comprehensive information on the calorie content of consumers' meal. Merchants can also make health trade-offs more prominent by changing the way information is delivered, structuring information to make health considerations more explicit. For example, providing

prominent visual cues to increase the salience of calorie information allows consumers to become aware of their own health claims.

4.2 Sustainable marketing

Merchants can achieve the goal of driving sales by guiding consumers to adopt specific estimates. For example, in order to market products such as chocolate that are contrary to long-term health goals, the psychological motivation of consumers seeking to rationalise indulgent eating is captured by guiding them to adopt numeric estimates that encourage taste satisfaction through controlled daily intakes. This marketing approach will make consumers aware of the need to control food intake appropriately, as opposed to engaging them in non-restrained high-calorie food intake. It will also have a positive effect on consumer overall healthy eating and enhance consumer loyalty.

5. Implications for future research

Firstly, future research could explore the impact on food decisions under different calorie estimation modes. Existing studies generalize estimation modes but do not evaluate the accuracy of estimates and whether they meet consumer claims in a comprehensive manner. In addition, real-life consumers usually mix multiple estimation modes. Therefore, consumers' choice of estimation models under different conditions could be explored in depth, e.g. setting up a crowded/comfortable dining environment as a context to examine consumers' model choice and food decision.

Secondly, future research could explore consumption behaviors under differentiated goal orientation. Compared with indulgent consumers, abstinent consumers tend to set rules to limit their food calorie intake. However, they may experience more pleasure than indulgent consumers when offering tempting food, and hedonic mindset can weaken self-regulatory mechanisms and increase the intake. Future research could examine the mechanisms at play in the transient failure of self-control among abstinent consumers and whether external interventions, such as reinforcing the visual contrast between healthy-and-unhealthy foods and providing real-time calorie intake, could be used to mitigate the effects of reduced self-control on consumption behaviour.

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