The Impact of Large Versus Small Menu Size on Calorie Estimation

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This research proposes that consumers estimate an item’s caloric content as greater (less) in a menu with more (fewer) choices. We suggest that consumers estimate higher calories in a larger menu because they use an average caloric content of a menu as a proxy within the subjectively formed calorie range.

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EXTENDED ABSTRACT
Estimating daily caloric intake, colloquially known as ‘counting calories,’ is a common tool for consumers seeking to maintain a healthy diet. Prior research on calorie estimation suggests that people tend to use heuristics when estimating number of calories; such reliance on heuristics, however, may be misguided, as judgmental biases such as the averaging bias or the healthy halo effect can result in inaccurate estimates (Chandon and Wansink 2007; Chernev and Chandon 2010; Raghunathan, Naylor, and Hoyer 2006). Prior research has focused on the biasing impact of meal-specific or item-specific factors (e.g., a meal with healthy and unhealthy items). Before evaluating each item, however, consumers may form an overall impression about a menu offered at a restaurant, which implies that the number of options on a menu may influence consumers’ perceptions of both items and the restaurant. In addition, previous studies on the impact of assortment size have focused on preferences between a large and a small assortment and its influence on brand perception and choice (Berger et al. 2007; Chernev 2012). Nevertheless, there has been less attention on how the number of options on a menu may affect consumers’ calorie estimation.

The present research aims at filling this gap by investigating the effect of menu size on consumers’ calorie estimations and its consequences for their food choices. We specifically focus on i) the impact of menu size, in terms of the number of available options, on calorie estimations and ii) the process that underlie this estimation bias. Across four studies, we manipulate menu size by presenting a sandwich menu with different numbers of options and then ask participants to estimate the caloric content of a target item. Note that we only varied the number of sandwiches on a menu, but balanced items based on perceived healthiness to prevent potential issues that may affect calorie estimations (e.g., differences in overall calories for the menu).

In Study 1A (N = 205), we hypothesize that participants provided with a menu with more items estimate a higher caloric content of a target item than those given a menu with fewer items. We also propose that this estimate is distorted irrespective of the perceived healthiness of a target. A 2 (menu size: large vs. small) × 2 (perceived healthiness of a target item: healthy vs. unhealthy) ANOVA revealed that participants estimated a higher caloric content of a target item in the large menu condition regardless of its perceived healthiness (M_{large} = 439.51 vs. M_{small} = 374.54 for a healthy target item; M_{large} = 495.87 vs. M_{small} = 435.58 for an unhealthy target item).

The objective of Study 1B (N = 149) is to replicate the effect of menu size on calorie estimations and, more importantly, to rule out an alternative explanation (i.e., the contrast effect). In this study, we predict that participants will provide higher calorie estimate for a target item in a larger menu, but they will not show significant differences between two small menu size conditions. As expected, the data support our hypothesis that participants presented with the large menu not only estimated higher calories for the target than those who saw the small menu size with two unhealthy sandwiches (M_{large} = 502.18 kcal vs. M_{small/healthy-unhealthy} = 432.06 kcal, p < .05) but also believed it has more calories than those who saw the small menu with healthy and unhealthy sandwiches (M_{large} = 502.18 kcal vs. M_{small/healthy-unhealthy} = 408.50 kcal, p < .02). More importantly, we found that participants in the two small conditions did not differ in their estimates for the target item (p > .50).

Study 2 (N = 95) examines the process underlying the menu size effect on calorie estimations. Building on prior literature on range theory (Parducci 1965), we specifically compare a range of calorie estimates for a menu (i.e., the highest and lowest calorie estimate) and determine whether this subjective range drives the menu size effect on calorie estimations. Once again, the larger menu led to higher calorie estimates for the target item (F(1, 93) = 3.59, p = .06; M_{large} = 427.20 vs. M_{small} = 370.39); importantly, this effect was mediated by the estimated calorie range for the menu (CI: .001 to .095). Though these results support our hypothesis that menu size widens estimated calorie ranges, one could argue that it is still unclear why they provided a greater calorie estimate within the range they widely formed. We propose that participants will tend to use an average of calorie estimates for the menu as a proxy when estimating a target item’s caloric content (Huttenlocher et al. 1991; Huttenlocher et al. 2000). We further suggest that both a subjective range of calorie estimates for the menu and the average calorie content sequentially mediate the impact of menu size on calorie estimation.

In Study 3 (N = 144), we directly test this hypothesis using two-step mediation analysis. The data support our hypothesis that the number of options on a menu significantly influences i) participants’ calorie estimates for the target (M_{large} = 739.1 kcal vs. M_{small} = 664.6 kcal, p = .09), ii) range of calorie estimates for the menu (M_{large} = 495.01 vs. M_{small} = 328.08; F(1, 142) = 27.68, p < .1), and iii) an estimated average calorie for the menu (M_{large} = 621 vs. M_{small} = 543.4; F(1, 142) = 4.53, p < .05). A sequential mediation analysis showed that there was a significant indirect effect of two mediators on calorie estimation (95% CI: .0075 to .229). In this study, we also compared the actual calories of participants’ sandwich choices in order to investigate how the calorie estimation bias affects consumers’ food choice. We expected that actual calorie contents in the selected sandwiches would be smaller when chosen from the large menu because participants may believe the same sandwich in a large (vs. small) menu contains more calories and thus choose one with fewer calories to maintain a healthy diet. As expected, the actual calorie content of participants’ food choice is significantly lower (vs. higher) in the large (vs. small) menu condition (M_{large} = 709.5 kcal vs. M_{small} = 783.3 kcal; F(1, 117) = 3.93, p = .05).

Taken together, our findings suggest that the number of options on a menu significantly influences consumers’ calorie estimations. Further, this paper proposes a new underlying mechanism of calorie estimation bias and its impact on consumer food choice.

REFERENCES


