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Commentary:

A COMMENTARY ON "THINKING ABOUT FOOD: AN ANALYSIS OF CALORIE ESTIMATION ACCURACY"

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Abstract

Mixon and Davis (2020; see this present issue of JISS) investigated the accuracy of consumers' ability to estimate calories by evaluating whether cognitive or dietary factors could predict accuracy. Factors such as BMI, gender, cognitive reflection, restrained eating, and numeracy were assessed. Mixon and Davis found that consumers were more likely to underestimate calories when the actual calories in items was over 500 calories, which, over time, may impact consumers' ability to maintain a healthy lifestyle. This commentary discusses socio-cultural factors that might offer possible explanations for Mixon and Davis' findings as well as recommendations for future research.

Keywords: obesity, food choice, calorie estimation, numeracy, consumption stereotype

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COMMENTARY

The United States is experiencing an obesity epidemic with the rates of adult obesity more than doubling from the late 1970s to the late 2000s. Data from the Centers for Disease Control (CDC) estimates a 42.4% prevalence of obesity among adults (Hales et al., 2020). While several potential variables may contribute to the rising rate of obesity, a great many factors influence dietary decision-making and the accuracy of calorie estimation.

Mixon and Davis (2020; see this present issue of JISS) explore the extent to which the accuracy of food calorie estimations and dietary decision making are influenced by cognitive factors. The authors looked at cognitive variables (e.g., numeracy, cognitive reflection) and dietary factors such as restrained eating to determine how they contribute to biases and calorie miscalculation. The researchers hypothesized that individuals who used more reflective processes and who had higher numeracy skills would more accurately estimate calories. Cognitive Reflection Test (Frederick, 2005), a method used to determine individual's preference for intuitive (system 1) or reflective (system 2) processes and the numeracy scale (Lipkus et al., 2001) were used to determine reflective processes and numeracy skills among participants. The degree to which participants engaged in restrained eating was assessed using the Dutch Restrained Eating Scale (van Strien et al., 1986). Neither cognitive reflection nor restrained eating predicted calorie estimation accuracy. One concerning finding was the observation that consumers tended to underestimate calories when the actual calories were over 500 calories. Differences in entree estimation based on gender were also observed with male participants, who scored higher on numeracy measures, more accurately estimating calories compared to their female counterparts.

Consumption stereotypes, or the judgments about others based on food intake, considers the type and or amount of food that is consumed (Vartanian et al., 2007). When studying factors that contribute to over- or under-estimating calories, consumption stereotypes should not be overlooked—especially in diet-conscious Western cultures. Mixon and Davis (2020) observed that male participants were more accurate in estimating calories in entrees compared to female participants. Women tend to have a different relationship with food, in part, due to the continual scrutiny and societal pressures women experience regarding their appearance. From a young age, girls are taught the female gender role or societal message that women should be thin and eat lightly (Vartanian et al., 2007). Therefore, it follows that females may inadvertently underestimate calories or serving sizes in an unconscious attempt to rationalize the type or amount of food being consumed in an effort to adhere to practices, such as eating lower calorie foods, that would aid in maintaining the societal message.

Another factor that could contribute to calorie over-estimation is whether the individual perceives the food to be healthy or unhealthy (Carels et al., 2007). According to Carels et al. (2006), a food that is categorized as unhealthy is believed to possess more

calories than one categorized as healthy. Perceived caloric value and factors such as fat content results in categorization of foods as healthy or unhealthy (Hayes et al., 2011). Body image, whether male or female, may predict healthy and unhealthy dieting behaviors, which could include estimation of calories or portion size (Markey & Markey, 2005). Efforts to lose weight may be negatively affected by the inability to accurately estimate calories in foods (Ruiz et al., 2019). Interestingly, the participants of the study conducted by Mixon and Davis (2020) who engaged in restrained eating, regardless of numeracy, underestimated calories in entrees while overestimating calories in fruits, vegetables, and desserts.

Numeracy is considered an important aspect of health and weight management (Huizinga et al., 2008). According to Fagerlin et al. (2007), accurate numeracy skills are essential for patients to understand the risk of medical treatments and health behaviors. Lower numeracy may impact the quality of decisions and assessment of risk. In the study conducted by Mixon and Davis (2020) individuals in the lower numeracy group were more likely to underestimate calories of entrees. However, those with higher numeracy estimated calories in desserts higher. Objective numeracy measures may not accurately assess one's aptitude. Lipkus et al. (2001) observed that highly educated participants have difficulty answering relatively simple numeracy questions. The use of a subjective numeracy scale might provide more accurate predictors of an individual's ability to perform tasks that may be numerically intensive.

Recommendations for future studies:

- Future studies evaluating calorie estimation should consider incorporating an assessment such as the Weight Control Behavior Scale (WCBS; French et al., 1995) to assess participants with unhealthy and healthy dieting behaviors. The WCBS measures weight loss behaviors and explores whether individuals engage in healthy (e.g., eating fruit and vegetables) and unhealthy (e.g., purging) dieting behaviors.

- Future studies should explore the relationship between consumption stereotypes, numeracy, and calorie estimation. Exploring the impact of societally imposed gender roles may provide insight into areas that could contribute to disordered eating, obesity, and body image issues.

- Future studies on calorie estimation should consider incorporating a mixed-method approach in which open-ended questions could be asked to gather more in-depth information. This approach may provide levels of insight that would not be possible with a quantitative study alone.

- Numerical Fact Panels (NFP) play an important role in decision making at the time of food purchase (Mixon & Davis, 2020). The researchers identified a need to change the NFP to simplify calorie and nutritional information to reduce miscalculations, which can have negative consequences with dietary selections. Future studies should explore the differences in calorie estimation between the tradition NFP and Traffic Light method to support this effort.

As a whole, the study by Mixon and Davis (2020) provides an excellent jumping-off point to further explore socio-cultural factors that may influence how individuals think about food. Those with lower numeracy scores tended to underestimate calories in entrees, while those with higher numeracy scores were more accurate. Many confounding variables could contribute to the accuracy of calorie estimation beyond numeracy and cognitive reflection. How individuals estimate calories in foods may be as related to societal messages as it is to one's numeracy skills or cognitive reflection process.

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