This is the accepted version of the publication Luo, A. (Angie), Hwang, Y., & Mattila, A. S. (2025). Showing Concern for Well-Being or Creating Discomfort? The Choice of Calorie Menu Labeling in Restaurants. Journal of Hospitality & Tourism Research, 0(0). Copyright © 2025 The Author(s). DOI: 10.1177/10963480251329004.

Showing Concern for Well-Being or Creating Discomfort? The Choice of Calorie Menu Labeling in Restaurants

Highlights:

- Examined consumers' restaurant-related responses to different calorie labeling formats
- Using interpretive calorie labeling can benefit health-focused restaurants
- Using interpretive calorie labeling can backfire in fine-dining restaurants

Abstract

With the rising concern for well-being, restaurants are gradually realizing the strategic significance of menu calorie labeling. However, how to appropriately communicate calorie information remains unclear. Considering the calorie labeling format and restaurant type, this research investigates how the labeling format influences consumer perceptions and responses. Findings from three studies show that compared with numeric calorie labeling, interpretive calorie labeling (i.e., color-coded and physical activity-based calorie labeling) leads consumers to perceive health-focused restaurants as being more concerned for consumers' well-being, resulting in higher visit intentions. However, activity-based (vs. numeric or color-coded) calorie labeling at fine-dining restaurants creates a sense of discomfort, leading to lower visit intentions. Practical suggestions are provided regarding when and how to use interpretive calorie labeling on restaurant menus.

Keywords: Interpretive calorie labeling, Well-being, Feeling of discomfort, Cognitive dissonance, Restaurant type

INTRODUCTION

With the growing importance of well-being, calorie menu labeling has gained significant attention (Berry et al., 2018; DiPietro et al., 2016; Petimar et al., 2021; Rummo et al., 2023). Disclosure of calorie information helps consumers make better food decisions, thus promoting healthy eating (DiPietro et al., 2016; Rummo et al., 2023). As consumers and governments have recognized the importance of calorie labeling, policymakers have enacted legislation mandating restaurants and other food service businesses to disclose calorie information on menus. For example, chain restaurants with 20 or more locations must provide calorie information (U.S. Food and Drug Administration, 2014). Restaurants and other food businesses have also realized the strategic importance of calorie menu labeling (Berry et al., 2018; DiPietro et al., 2016). For example, informing consumers about a restaurant's voluntary provision of calorie labeling has a positive effect on consumers' patronage intentions (Berry et al., 2018). Since more and more restaurants now provide numeric calorie information (whether required or voluntary), the positive effect of such information may be attenuated because customers may think this is what restaurants should do. Moreover, consumers might expect other calorie information formats, such as interpretive calorie labeling (Miller et al., 2022; Morley et al., 2013). Simply displaying calorie information in a numeric format is not an optimal way to communicate with customers and help them make better food decisions (Bialkova et al., 2014; Dowray et al., 2013). Therefore, recent research has shifted focus to interpretive labeling (e.g., color-coded and physical activity-based calorie labeling) that can be more helpful for consumers' decision-making (Cutello et al., 2024; Daley et al., 2020; Jin et al., 2020; Miller et al., 2022; VanEpps et al., 2021).

However, several research gaps remain. Firstly, previous studies mainly focus on comparing the effectiveness of interpretive (vs. numeric) calorie labeling on consumer outcomes such as attention, calorie consumption, and healthy choices and demonstrate the superior effect of interpretive (vs. numeric) calorie labeling (Cutello et al., 2024; Kim et al., 2018; VanEpps et al., 2021). Restaurants use calorie menu labeling to attract consumers (Berry et al., 2018; DiPietro et al., 2016). However, consumers' restaurant-related responses (e.g., restaurant perceptions and visit intentions) to various calorie labeling formats have been overlooked. To address this gap, the current research 1) contrasts interpretive and numeric calorie labeling on consumers' perceptions of the restaurant's concern for consumer well-being and visit intentions and 2) demonstrates the underlying mechanisms. Secondly, previous research demonstrates that the effectiveness of calorie labeling formats in promoting healthy eating varies, with interpretive calorie labeling being the most effective, followed by numeric labeling (Cutello et al., 2024; Kim et al., 2018; Talati et al., 2016; VanEpps et al., 2021). However, the potential drawbacks of interpretive calorie labeling have been overlooked. In addition, consumers' preferences for calorie menu labeling formats across restaurant types remain unknown. To address these gaps, this research investigates whether interpretive calorie labeling might induce cognitive dissonance/discomfort. Drawing on the cognitive dissonance theory (Festinger, 1957), the current research aims to demonstrate that consumers may appreciate interpretive calorie labeling (e.g., color-coded and activity-based information) in health-focused restaurants as it is aligned with the concept of the restaurants and consumers' desires to eat healthy (i.e., experience cognitive consonance). However, consumers might feel discomfort with interpretive calorie labeling that serves as a reminder of healthy eating in fine-dining restaurants characterized by enjoyment and indulgence (i.e., experience cognitive dissonance). To further address the gap

regarding consumers' preferences for calorie menu labeling formats and how they may vary across restaurants, the current research identifies the most appropriate calorie menu labeling based on restaurant types. This research provides important managerial implications for food service providers in effectively communicating calorie information on restaurant menus.

LITERATURE AND HYPOTHESES

Importance of Calorie Labeling

The growing emphasis on well-being has led to a notable focus on calorie labeling. Calorie labeling extends beyond packaged food products, encompassing restaurant food items prepared for immediate consumption (Berry et al., 2018; Kim et al., 2018; Rummo et al., 2023). As of May 2018, The 2010 Affordable Care Act (PPACA, Section 4205), requires chain restaurants with 20 or more locations to post calorie information on their menus. The decision to implement such a regulation stems from recognizing the significant role of out-of-home food consumption in shaping dietary habits and overall health outcomes. Compared to home-prepared food, restaurant items generally contain higher levels of total and saturated fat and are frequently served in large portions, encouraging excessive consumption (Guthrie et al., 2002; Young & Nestle, 2007). In addition, out-of-home food consumption, such as restaurant dining, accounts for over 50% of total food expenditures in the U.S. (Kim et al., 2018). Such a substantial and continuous increase has raised government concerns as it is likely to accelerate the occurrence of obesity (Kant et al., 2015). The calorie disclosure requirement represents a proactive measure to address the growing concerns surrounding public health, particularly the rising obesity rates. By requiring restaurants to disclose calorie information, policymakers aim to empower consumers to make more informed and potentially healthier food choices when dining out (Long et al., 2015; Rummo et al., 2023). In addition, due to the growing trend of health consciousness, consumers

appreciate menu calorie labeling (approximately 83% of Americans and 80% of British favor menu calorie labeling) (Hojjat, 2015; Tapper, 2022), and such menu labeling initiatives have spread worldwide (e.g., in Australia, and Canada) (Sacco et al., 2017).

While an increasing number of restaurants include calorie labeling on their menu, such information is primarily presented in a numeric format. Previous research indicates that consumers find it challenging to understand and utilize the calorie information on menus as they have no idea about what the number of calories means and how the calorie content relates to their daily calorie intake (Blumenthal & Volpp, 2010; Morley et al., 2013). Using a numerical format fails to provide sufficient information to consumers, which explains why such menu labeling has no significant effect on reducing consumers' calorie intake (Dowray et al., 2013; Kim et al., 2018; Long et al., 2015). Consequently, recent research has explored interpretive calorie labeling (Cutello et al., 2024; Daley et al., 2020; Jin et al., 2020; Miller et al., 2022; VanEpps et al., 2021).

Interpretive Calorie Labeling

Interpretive calorie labeling uses explanatory or evaluative information to help clarify the calorie content (Cutello et al., 2024; Sacco et al., 2017; VanEpps et al., 2021). One interpretive calorie labeling format is color-coding. It uses the traffic light system to indicate the calorie content with red as high, yellow as medium, and green as low. Color-coded calorie labeling is more intuitive as it provides visual elements (colors) to assist consumers in quickly understanding the meaning of the calorie content by leveraging existing firmly held associations (e.g., the association between a red light and stopping) (VanEpps et al., 2021). In other words, color-coded calorie labeling features both "good" and "bad" choices (e.g., food coded as red signals high calories and "bad" choice, and green signals healthier choices). Traffic light labeling

is easier to understand than numeric calorie labeling and can quickly assist consumers in making decisions (Borgmeier & Westenhoefer, 2009; Talati et al., 2016).

Physical activity-based labeling is another interpretive calorie labeling format. It illustrates the calorie content by showing the amount of physical activity required to burn a given number of calories for a food or beverage product. Framing calorie information via a physical activity-based format is meaningful and intuitive because it translates to something people can easily understand (Cutello et al., 2024; Daley & Bleich, 2021; Viera et al., 2019). Therefore, such information captures attention and influences consumers' choices more effectively than numeric calorie labeling (Daley et al., 2020; Jin et al., 2020; Swartz et al., 2013). In addition, physical activity-based labeling can raise awareness of calorie balance by emphasizing a direct link between calorie intake and the amount of exercise needed to burn off the calories consumed (Jin et al., 2020; Swartz et al., 2013). Previous research suggests that physical activity-based labeling is more effective compared to other calorie labeling in promoting healthy eating (Kim et al., 2018; Pang & Hammond, 2013).

Table 1 shows the descriptions for these three calorie labeling formats with examples. While prior research demonstrates the superior effect of interpretive (vs. numeric) calorie labeling on reduced calorie intake, little is known about whether interpretive calorie labeling will backfire and how different calorie labeling formats influence consumers' restaurant-related responses and preferences. Relying on the cognitive dissonance theory (Festinger, 1957), we argue that consumers' appreciation of such information might depend on restaurant types, as consumers make dining choices based on their dining goals (e.g., healthy eating or indulging in the culinary experience) (Ha & Jang, 2013; Kang et al., 2015).

Table 1. Descriptions for Different Menu Calorie Labeling Formats

Menu Calorie Labeling Format	Description	Example
Numeric Calorie Labeling	Uses numbers to show the exact calorie content.	
Color-coded Calorie Labeling	Assigns caloric information ratings by incorporating a color scheme (red indicating high caloric content, yellow for medium, and green for low) alongside the numeric labeling.	
Physical activity-based Calorie Labeling	Presents a scheme that illustrates the amount of physical activity needed to burn a specific number of calories.	

Theory of Cognitive Dissonance and Perception of Menu Calorie Labeling

According to the cognitive dissonance theory, dissonance is a psychological phenomenon that arises when there is a discrepancy between an individual's beliefs and an outcome that challenges such beliefs (Festinger, 1957). Dissonance typically emerges through three primary mechanisms: logical disparity; incongruence between one's attitudes and actions or between two separate behaviors, and conflicts between expectations and reality (Loudon & Della Bitta, 1993; Hasan & Nasreen, 2012). Consequently, individuals tend to experience psychological discomfort when the relevant information, such as actions, feelings, ideas, beliefs, and environmental cues, are inconsistent or contradictory (Elliot & Devine, 1994; Festinger, 1957; Harmon-Jones, 2019). To prevent psychological discomfort, individuals avoid encountering information that conflicts with their desires and engage in behavioral changes to seek consistency and harmony between their internal thoughts and external realities (Book et al., 2018; Festinger, 1957; Harmon-Jones, 2019). In our case, different calorie labeling formats may cause cognitive dissonance/consonance, leading to varying consumer responses. The experience of cognitive dissonance and consonance

depends on whether calorie information aligns with the concepts of restaurants and consumers' expectations.

In Health-Focused Restaurants: Concern for Consumers' Well-Being (Cognitive Consonance)

In line with the growing emphasis on health among consumers, there has been a remarkable upsurge in the number of health-focused restaurant brands within the restaurant industry, such as True Food Kitchen, the Little Beet, Protein Bar & Kitchen (Akkam, 2024; Feigle, 2024; Lalley, 2021; Vivacqua, 2023). These health-focused restaurant brands aim to provide healthier and higher-quality foods for consumers and promote themselves by descriptions such as "locally grown," "superfood," "fresh," and "sustainable" (Liu et al., 2019; Restolabs, 2023). Health-focused restaurants target consumers who are highly concerned about their health, and such consumers expect health-focused restaurants to be concerned about their well-being (Jeong & Jang, 2015; Newson et al., 2015). Therefore, in health-focused restaurants, providing calorie labeling on the menu is expected (Berry et al., 2018), triggering cognitive consonance. However, as displaying calorie information in a numeric format is usually required by the federal government and even widely used by restaurants that are exempt from this requirement, numeric labeling may fall short of satisfying consumers' needs and expectations (Berry et al., 2018; Bialkova et al., 2014; Dowray et al., 2013; Morley et al., 2013). Health-focused restaurants are expected to display concern for consumers' well-being through menu design (Liu et al., 2019). When service providers go the extra mile to meet consumers' desires, consumers are more likely to perceive that the service providers care about them, developing positive responses (Morales, 2005). For example, informing consumers about a restaurant's voluntary (vs. mandatory) provision of calorie labeling makes consumers feel that the restaurant cares about its customers' well-being, leading to more positive attitudes and higher visit intentions (Berry et al., 2018).

Therefore, compared to simply displaying calorie information in a numeric format, explanatory or evaluative information (i.e., interpretive calorie labeling) goes the extra mile to help clarify the calorie content, making it easier for consumers to understand. Customers may believe that health-focused restaurants using such labeling are more genuine and concerned for the well-being of their customers, leading to more favorable responses.

In Fine-Dining Restaurants: Feeling of Discomfort (Cognitive Dissonance)

Interpretive calorie labeling may backfire in fine-dining restaurants. Consumers decide where to dine based on their dining values (Ha & Jang, 2013; Kang et al., 2015). Consumers choose fine-dining restaurants to satisfy their need for enjoyment and relaxation. Fine-dining restaurants aim to satisfy consumers' hedonic desires, such as emotionally appealing ambiance, exquisite cuisine, indulgence, and sensory enjoyment (Hwang & Ok, 2013; Parsa et al., 2020; Tsaur & Lo, 2020). Fine-dining customers prioritize emotional needs, such as indulging in the culinary experience over healthy eating (Kim et al., 2018). In other words, they prioritize enjoying the meal in the present moment by temporarily setting aside their health-conscious preferences. Interpretive calorie labeling in fine-dining restaurants reminds consumers of healthy eating, triggering cognitive dissonance that motivates them to seek consistency between their internal thoughts and external realities by avoiding information that conflicts with their desires and engage in behavioral changes (i.e., avoid visiting such restaurants) (Book et al., 2018; Festinger, 1957; Harmon-Jones, 2019).

Compared to numeric calorie labeling, color-coded calorie labeling promotes healthy eating by judging consumers’ decisions through a visual representation of “good” and “bad” choices with green and red colors, while physical activity-based labeling promotes healthy eating by raising awareness of the consequences of consuming a certain number of calories (Jin et al.,

2020; Swartz et al., 2013). Therefore, these two labeling formats are more likely to make consumers feel guilty or hesitate when they expect to indulge themselves regardless of the food's calorie content (Cutello et al., 2024; Weingarten & Lagerkvist, 2023). In other words, these two interpretive calorie labeling formats (vs. numeric calorie labeling) are more likely to place consumers in a predicament where their desire to indulge in fine-dining restaurants conflicts with the consideration of healthy choices due to the warning effect of interpretive calorie labeling (Cutello et al., 2024; Weingarten & Lagerkvist, 2023). This conflict, in turn, induces cognitive dissonance, reflected by feelings of psychological discomfort (Elliot & Devine, 1994). When individuals experience psychological discomfort, they tend to perceive stimuli as unpleasant. Consequently, they strive to avoid such stimuli to alleviate psychological tension (Ong, 2019).

Taken together, we propose that,

H1: For a health-focused restaurant, using interpretive calorie labeling (vs. numeric calorie labeling) will lead to higher perceptions of the restaurant's concern for its customers' well-being. Such a difference will be attenuated for a fine-dining restaurant.

H2: For a health-focused restaurant, perceptions of concern for customers' well-being will mediate the impact of the calorie labeling format on consumer responses. Such mediation will be attenuated for a fine-dining restaurant.

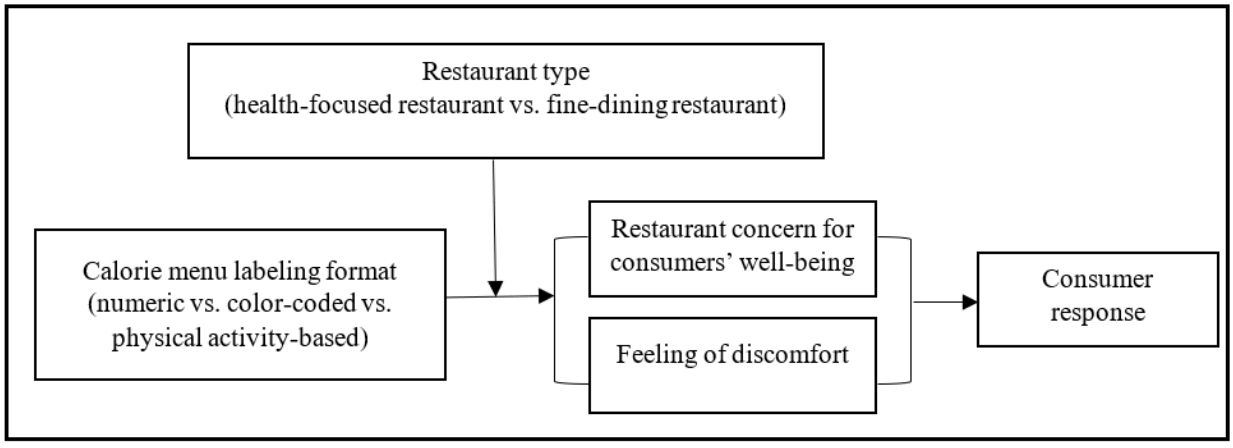
H3: For a fine-dining restaurant, using interpretive calorie labeling (vs. numeric calorie labeling) will lead to a stronger feeling of discomfort. Such a difference will be attenuated for a health-focused restaurant.

H4: For a fine-dining restaurant, the feeling of discomfort will mediate the impact of the calorie labeling format on consumer responses. Such mediation will be attenuated for a health-focused restaurant.

Empirical Overview

Figure 1 shows the conceptual model of this research. Three studies were conducted to explore the underlying mechanisms and test our hypotheses. Specifically, starting with a qualitative exploration, Study 1 provided initial evidence for the two underlying mechanisms explaining consumers' responses to different calorie labeling. Then, in Study 2, a 2 (restaurant type: health-focused restaurant vs. fine-dining restaurant) by 3 (labeling format: numeric vs. color-coded vs. physical activity-based) between-subjects experimental design was employed to further substantiate the findings from Study 1 and test our conceptual framework. Lastly, Study 3 used a recommendation task to identify the most appropriate calorie menu labeling for different restaurant types.

Figure 1. Conceptual Model



STUDY 1

Study Design and Participants

The objective of Study 1 is to provide initial evidence for two underlying mechanisms behind consumers' responses to different calorie labeling. A total of 101 U.S. participants were recruited from Prolific. Most (76.2%) were between 18 and 49 years old, 36.6% of the respondents were male, 49.5% had a college degree, and 73.3% had an annual household income over $40,000. Three versions of the restaurant's beverage menu were created, the only difference being the calorie labeling format (see Appendix). Participants were randomly shown one of the three versions and asked to share their thoughts regarding the calorie information on the menu ("What are your thoughts on the presentation of the calorie information? Do you like it or not? Why?").

Results

Qualitative thematic and emotional textual analyses were conducted with Nvivo 12 (Kuckartz, 2013). Coding was conducted in a "down to up" fashion to reflect the original meaning of the participants (i.e., the node and meaning were completely generated from the text). We discovered four main themes: attitude toward calorie information disclosure, impact on consumers' decisions, dining purpose, and attitude toward calorie labeling format.

Overall perceptions of calorie labeling

Some participants believed that presenting the calorie information was informative, as it could improve the transparency of their food choices and was particularly beneficial for those who want to manage their calorie intake. More importantly, these participants perceived the restaurant to be considerate and responsible. For example:

(Participant 38) "I think listing the calories is a responsible decision by the restaurant."

(Participant 81) "It makes me think twice about ordering a calorie-laden drink, so overall I like it. I think it would help me be more thoughtful about my meal choices."

However, other participants emphasized enjoyment and felt uncomfortable about such information. They thought presenting calorie information catered to the diet culture, which could bring extra stress for those who want to enjoy their dining experiences. They prefer to choose whatever they want regardless of the calorie content. For example:

(Participant 27) "I don't like it. I prefer to go out to a restaurant and enjoy the experience, providing this information will make me think about any flaws in my personal choice. I will feel judged on my decision."

(Participant 58) "I don't like it at all… I think people want to enjoy their trip out instead of counting calories. Adding this info just feels performative and overbearing."

Mixed opinions were also identified. Some participants recognized the benefits of calorie information but experienced uncomfortable feelings when such information was provided. These participants are more likely to be in a torn state. For example:

(Participant 6) "Seeing the calorie information is helpful, but made me feel ashamed for wanting a sweet drink, which puts a damper on the dining out experience."

(Participant 47) "It is helpful for those being health conscious, but could also cause relapse for those suffering from an eating disorder."

Influence of calorie labeling format

Furthermore, participants' responses varied across the calorie labeling formats. We coded the responses based on valence (i.e., positive, negative, mixed/indifferent). Results of the Chi-square

test show that participants' responses varied significantly across the three calorie labeling formats ($\chi 2(4) = 15.334$, $p < .01$). Specifically, 66.7% of the negative responses were from participants viewing activity-based calorie labeling (numeric format: 20%; color-coded format: 13.3%). The content analysis results and the quantitative evidence show that activity-based calorie labeling was controversial. Some appreciated it, finding the activity-based labels informative and easy to comprehend. For example:

(Participant 43) "I really like that the menu goes further than just the calorie count. Knowing how much energy you'd need to expend, even a rough estimate, makes you think more about your food intake."

(Participant 96) "I think a lot of people will appreciate the extra effort that the restaurant put in...It gives this information in a clear and easy-to-understand way, which is a win-win for everyone, the restaurant and the customers."

However, around 30% of participants in the activity-based labeling condition showed strong negative reactions. They perceived the information about the required exercise time to burn the menu's calories as insensitive and unnecessary. Compared to the other two types of calorie labeling (i.e., color-coded and numeric calorie labeling), activity-based calorie labeling elicited stronger negative responses. The activity-based calorie labeling was perceived as overly strict for diet-sensitive consumers, contrasting with the enjoyment typically associated with dining at a restaurant. For example:

(Participant 2) "I think showing the calories on its own would be enough... For people with eating disorders, it can be very negative. What if you're on a diet, and this is your one cheat meal

after all the hard work, you make that person rethink everything. Can be perceived as very insensitive."

Participants indicated that the color-coding system enabled them to swiftly distinguish low-calorie options, thereby increasing their intentions to select items marked with green. Generally, "green" is laden with rich metaphors, symbolizing a permissible, sustainable, and correct choice. Consequently, consumers receive positive reinforcement when they opt for food items marked with a green code. This approach contrasts with the activity-based format, which motivates consumers by highlighting the negative consequences of high-calorie options. Color coding subtly influences consumer decisions, offering a less aggressive alternative to the activity-based format. For example:

(Participant 33) "a hard number and an indicator color at a glance helps steer people to helpful choices, and gives the number conscious dieter the info right where they need it."

(Participant 82) "it's not presenting a pushy message about health; it is simply informing the customers about their choices."

The numeric calorie labeling elicited more mixed/indifferent responses (around 23%) from participants (color-coded format: 15%; activity-based format: 0%). It was perceived as beneficial but could not strongly influence decisions except for health-conscious participants. For example,

(Participant 44) "It's ok. I don't really pay a lot of attention to that type of information unless it's a particularly high number."

(Participant 73) "Many restaurants don't provide that information on the menu. It allows customers to make more health-conscious choices when deciding on a drink."

Discussion

Study 1 initial evidence for two underlying mechanisms behind consumers' responses to different calorie labeling. Consumers appreciate calorie information due to its benefits for consumers' well-being. On the other hand, consumers feel uncomfortable with calorie information in an activity-based format when they focus on enjoyment. A quantitative experimental approach was adopted to further substantiate the findings from Study 1.

STUDY 2

Study Design and Participants

A 2 (restaurant type: health-focused vs. fine-dining restaurant) by 3 (labeling format: numeric vs. color-coded vs. physical activity-based) between-subjects experimental design was employed. A total of 302 U.S. participants were recruited from Prolific. Those who failed attention checks were excluded, leaving 299 participants. Most (81.9%) were between 18 and 49 years old, 40.8% of the respondents were male, 42.5% had a college degree, and 78.3% had an annual household income over $40,000.

Stimuli and Procedures

Adapted from previous research, restaurant type was manipulated by providing relevant restaurant information (Liu et al., 2019). The following information was provided in the health-focused restaurant condition: “Tarren is a regional health-conscious restaurant. Its entire menu is based on locally-grown, non-GMO, antibiotic-free ingredients, and it is committed to healthy eating and sustainability”. In the fine-dining restaurant condition, participants were told that: “Tarren is a regional fine-dining restaurant. Its entire menu is based on a balance of taste, texture, and presentation, and it is committed to sensory delight and gastronomic pleasure.” To

manipulate labeling format, three versions of the menu with only difference in calorie labeling format for menu items were created (see Appendix).

Participants were randomly assigned to one of the six conditions. They were asked to read the restaurant information and the menu. Then, their perceptions of the restaurant's concern for consumers' well-being (i.e., "After reviewing the menu, I believe that this restaurant is concerned about the well-being of its customers", 1=strongly disagree, 7=strongly agree; 1=not at all, 7=very much so; r=.89) (Newman et al., 2014), feelings of discomfort (e.g., "While processing the menu, I felt uncomfortable/conflicted/confused", 1=not at all, 7=a lot; α=.78) (Liu et al., 2018) and patronage intentions (e.g., "How likely/probably are you to eat at this restaurant based upon the information you viewed on the menu?", 1=very unlikely, 7=very likely; 1=not at all probable, 7=very probable; r=.94) (Berry et al., 2018) were measured followed by demographic questions.

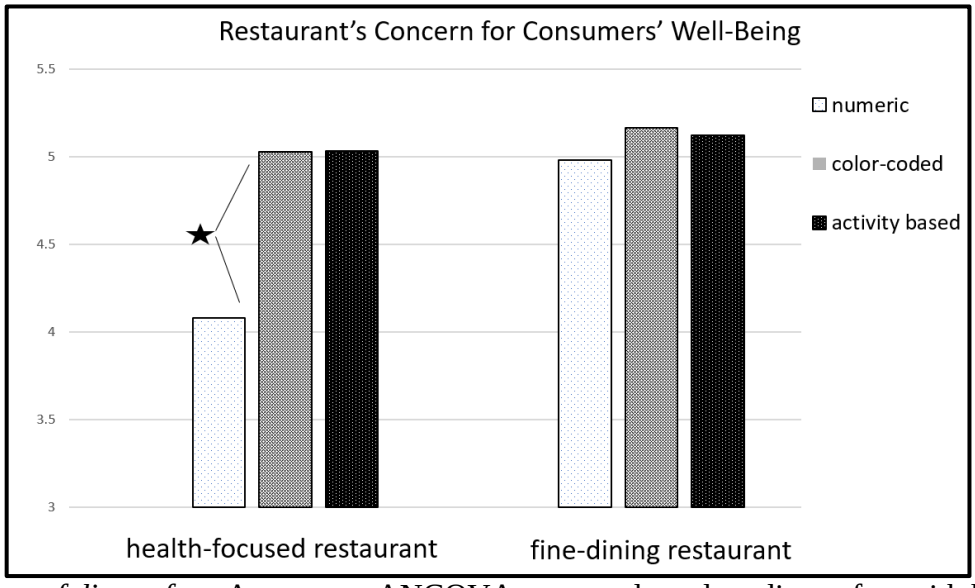
Results

Manipulation checks. A MANOVA was used to check the manipulation of calorie labeling. The results revealed only a main effect of calorie labeling type ($F = 183.00$, $p < .001$). Specifically, participants in the color-coded condition agreed that the calorie information was presented in colors (M=6.71) more than their counterparts in numeric (M=1.56, 95%CI=[4.737, 5.580]) and activity-based conditions (M=2.69, 95%CI=[3.605, 4.447]) ($F(2, 293)=321.76$, $p<.001$). Participants in the activity-based condition agreed that the calorie information was displayed based on the exercise time required to burn off calories (M=5.89) more than their counterparts in numeric (M=1.41, 95%CI=[4.010, 4.877]) and color-coded conditions (M=1.68, 95%CI=[3.744, 4.606]) ($F(2, 293)=256.69$, $p<.001$). Since calorie information was displayed numerically in all conditions, no significant difference was identified regarding participants' agreement on whether

the calorie information was displayed numerically ($F(2, 293)=1.66$, $p>.05$). In addition, participants in the health-focused restaurant condition agreed that the restaurant was a health-conscious restaurant (differ from the scale midpoint 4: $M=5.99$, $t=17.29$, $p<.001$). In contrast, participants in the fine-dining restaurant condition agreed that the restaurant was a fine-dining establishment (differ from the scale midpoint 4: $M=5.54$, $t=10.59$, $p<.001$). Taken together, these results indicate that our manipulations were successful.

Perceptions of restaurant's concern for consumers' well-being. A two-way ANCOVA was conducted on perceptions of the restaurant's concern for consumers' well-being with health consciousness as the covariate. The results revealed a significant interaction between restaurant type and calorie labeling format ($F (2, 292)=3.06$, $p<.05$), and it is visualized in Figure 2. Specifically, when the health-focused restaurant used interpretive calorie labeling (vs. numeric calorie labeling), the perceived concern for consumers' well-being was higher ($F (2, 292)=8.94$, $p<.001$; $M_{numeric}=4.088$, $M_{color}=5.03$, $M_{activity}=5.032$). Both color-coded or activity-based labeling resulted in perceptions of concern for consumers' well-being than numeric calorie labeling ($M_{numeric}$ vs. M_{color}: 95%CI=[-1.461, -.443]; $M_{numeric}$ vs. $M_{activity}$: 95%CI=[-1.470, -.439]; M_{color} vs. $M_{activity}$: 95%CI=[-.515, .510]). However, no significant differences were identified in the fine-dining context ($F (2, 292)=.27$, $p>.05$; $M_{numeric}=4.981$, $M_{color}=5.166$, $M_{activity}=5.123$). These results support H1.

Figure 2. The Effects of Restaurant Type and Labeling Format on Restaurant's Concern for Consumers' Well-Being



Feelings of discomfort. A two-way ANCOVA was conducted on discomfort with health consciousness as a covariate. The results revealed a significant interaction between restaurant type and calorie labeling format ($F(2, 292)=3.05$, $p<.05$), and it is visualized in Figure 3. When the fine-dining restaurant used interpretive calorie labeling (vs. numeric calorie labeling), participants felt more discomfort ($F(2, 292)=3.59$, $p<.05$; $M_{numeric}=2.308$, $M_{color}=2.203$, $M_{activity}=2.95$). Moreover, physical activity-based calorie labeling led to higher levels of discomfort than numeric and color-coded calorie labeling ($M_{numeric}$ vs. $M_{activity}$: 95%CI=[-1.239, -.045]; $M_{numeric}$ vs. M_{color}: 95%CI=[-.492, .702]; M_{color} vs. $M_{activity}$: 95%CI=[-1.341, -.153]). However, no significant differences were identified in the health-focused restaurant condition ($F(2, 292)=.96$, $p>.05$; $M_{numeric}=2.801$, $M_{color}=3.196$, $M_{activity}=2.889$). These results support H3.

Figure 3. The Effects of Restaurant Type and Labeling Format on Discomfort

Mediation Analyses. A bootstrapping moderated mediation analysis with 5000 samples (PROCESS model 7, Hayes, 2013) was conducted with calorie labeling format as the independent variable, restaurant type as the moderator, perceptions of the restaurant's concern for consumers' well-being and feelings of discomfort as parallel mediators and visit intention as the dependent variable. The results indicate that perceptions of consumers' well-being mediated the impact of the calorie labeling format on visit intention in the health-focused restaurant condition (indirect effect =.34, 95%CI=[.1309, .5613]) but not in the fine-dining restaurant condition (indirect effect =.05, 95%CI=[-.1034, .2005]), supporting H2. However, feelings of discomfort mediated the impact of the calorie labeling format on visit intention in the fine-dining restaurant condition (indirect effect =-.11, 95%CI=[-.2162, -.0157]) but not in the health-focused restaurant condition (indirect effect =-.02, 95%CI=[-.1248, .0895]), supporting H4.

Discussion

Study 2 empirically tests the two potential underlying mechanisms identified in Study 1 and examines the interactive effect of restaurant type and calorie labeling format, contrasting interpretive and numeric calorie labeling. This begs the question: among these three versions of

calorie labeling, which is more appropriate for health-focused restaurants and which is more suitable for fine-dining restaurants? Therefore, we conducted Study 3.

STUDY 3

Study Design and Participants

A single factor (restaurant type: health-focused vs. fine-dining restaurant) between-subjects design was employed. The manipulation for restaurant type was the same as in Study 2. A total of 300 U.S. participants were recruited from Prolific. Those who failed attention checks were excluded, leaving 298 participants. Most (81.5%) were between 18 and 49 years old, 41.3% of the respondents were male, 40.9% had a college degree, and 73.2% had an annual household income of more than $40,000. Participants were randomly assigned to either a health-focused restaurant or a fine-dining restaurant. After reading the restaurant description, they were shown three versions of the restaurant menu with only differences in calorie labeling format (same as in Study 2). Then, they were asked to recommend one version to the restaurant and justify their recommendation ("Which version do you recommend for the restaurant?" "Why did you recommend this version?").

Results

Recommendation. Results of the Chi-square test showed that participants' menu choices varied significantly across restaurant types ($\chi 2(2) = 15.85$, $p < .001$) (see details in Table 2). Numeric calorie labeling was more likely to be selected for the fine-dining restaurant (57%) than for the health-focused restaurant (36.2%). However, activity-based calorie labeling was recommended by a higher proportion of participants for the health-focused restaurant (17.4%) than for the fine-dining restaurant (6.7%). Among the three versions of the restaurant menu, the one with color-coded calorie labeling was chosen by a significantly higher proportion of

participants (46.3%) when considering the menu for a health-focused restaurant, followed by the one with numeric calorie labeling (36.2%) and physical activity-based calorie labeling (17.4%). However, for a fine-dining restaurant, a significantly higher proportion of participants chose the menu with numeric calorie labeling (57%), followed by color-coded (36.2%) and physical activity-based calorie labeling (6.7%).

Table 2. Chi-Square Test

	Restaurant Type					
Recommendation	*Health-focused Restaurant*		*Fine-dining Restaurant*		**Total**	
Numeric calorie labeling	54_a	36.2%	85_b	57%	139	46.6%
Color-coded calorie labeling	69_a	46.3%	54_a	36.2%	123	41.3%
Activity-based calorie labeling	26_a	17.4%	10_b	6.7%	36	12.1%
Total	149	100%	149	100%	298	100%

Note. Each subscript letter denotes a subset of restaurant type categories whose column proportions do not differ significantly from each other at the .05 level.

Reason. Content analysis was conducted with Nvivo 12 to identify the reasons for the specific calorie labeling recommendations. Participants chose the numeric calorie labeling for the fine-dining restaurant for two main reasons. First, participants indicated that the numeric calorie labeling was neutral so that they could make decisions based on their preferences. Second, the numeric calorie labeling was simple, clean, and aesthetically appealing, which was considered important for a fine-dining restaurant. For example:

(Participants 54) "The others make you feel guilty to eat."

(Participants 55) "It's classy and kinder to all customers."

(Participants 270) "It fits what I would expect a fine dining menu to look like. Simple and sophisticated."

Participants chose the color-coded labeling for the health-focused restaurant because it is more eye-catching and visually appealing. In addition, the color-coded labeling made calorie information easier to understand and encouraged participants to choose food items marked with green codes, making them feel good about their decisions. The color-coded system helps promote healthier choices, and is consistent with the health-focused restaurant concept. For example,

(Participants 149) "I think the color coding is the easiest for a person to digest while reading, making it the most comprehensive way to take in information quickly and effectively."

(Participants 255) "The color coding offers more to the eye and draws you to the desired health-conscious meals"

Activity-based calorie labeling was the least recommended among the three versions because it was perceived as insensitive to certain groups of customers (e.g., people with limited mobility). It also induced feelings of guilt. For example,

(Participants 61) "...the sport one makes you feel guilty for eating and enjoying higher calorie items"

(Participants 141) "...the mins needed running doesn't really apply to all; for example, the information for me is irrelevant since I can't run, my knees are bad, so I am limited in what type of exercise I can do."

However, it was recommended by a higher proportion of participants for the health-focused restaurant (17.4%) than for the fine-dining restaurant (6.7%). Participants who recommended activity-based calorie labeling expressed that providing exercise time needed to burn calories was interesting and offered information about the consequences of their choices. This was particularly salient for health-conscious participants and those who like to exercise. For example,

(Participants 52) "It'd be cool and unique .. also good information."

(Participants 197) "the restaurant is truly health conscious, this one clearly and easily explains how detrimental the extra calories are for each meal."

Discussion

Study 3 identified the most appropriate calorie menu labeling for different restaurant types. Overall, numeric calorie labeling is most suitable for fine-dining restaurants. When consumers want to enjoy their food and dining experiences, the numeric calorie labeling provides necessary information without making consumers feel bad about their choices. However, color-coded calorie labeling is the most recommended for health-focused restaurants due to its effectiveness in promoting healthier choices. Compared to numeric calorie labeling, it is more eye/attention-catching and makes information easier to understand. It also makes consumers feel better about their decisions than activity-based calorie labeling. Activity-based calorie labeling pushes them to make the "right" decisions by showing the more salient consequences (i.e., pain) of their bad choices.

GENERAL DISCUSSION

While previous research has demonstrated the superior effect of interpretive (vs. numeric) calorie labeling on consumer decisions, this research enriches the literature by 1) focusing on consumers' restaurant-related responses (e.g., restaurant perceptions and visit intentions) to different calorie labeling formats and 2) identifying conditions where interpretive calorie labeling backfires. Specifically, the qualitative study (Study 1) indicates that some consumers appreciate calorie information on the menus and perceive restaurants providing calorie labeling, especially interpretive calorie labeling, as more concerned for consumers' well-being, while others feel uncomfortable reading calorie information. Study 2 further reveals that consumers perceive health-focused restaurants using interpretive (vs. numeric) calorie labeling as more

concerned for consumers' well-being, leading to higher visit intentions. Activity-based calorie labeling at fine-dining restaurants makes consumers feel more uncomfortable than numeric and color-coded labeling, reducing visit intentions. Furthermore, to enhance practical implications, findings from the choice experiment (Study 3) suggest that numeric calorie labeling is most appropriate for fine-dining restaurants and color-coded calorie labeling for health-focused restaurants.

Theoretical Implications

This research makes several theoretical contributions. First, it provides new insights into menu calorie labeling research by shedding light on the influence of labeling format on consumers' restaurant-related responses. Previous research on menu calorie labeling has focused on consumer-related outcomes such as attention, calorie consumption, and healthy choices (Cutello et al., 2024; Kim et al., 2018; VanEpps et al., 2021). While Berry et al. (2018) examined the influence of menu calorie labeling on consumers' retailer-related responses, the impact of different menu calorie labeling formats on consumer responses is poorly understood. Responding to the call for interpretive labeling to better assist consumers (Cutello et al., 2024; Miller et al., 2022; VanEpps et al., 2021), we examine how different calorie labeling formats influence consumer responses across different restaurant types. Since interpretive calorie labeling makes it easier for consumers to understand and utilize the calorie information on menus, customers are more likely to visit health-focused restaurants using interpretive calorie labeling. However, interpretive calorie labeling backfires in fine-dining restaurants where consumers prioritize enjoyment over healthy eating.

Second, this research contributes to the literature examining consumers' well-being by demonstrating the potential contradiction between physical and psychological well-being. Many

studies have compared the effectiveness of different calorie labeling formats in reducing calorie consumption and promoting healthy eating (Kim et al., 2018; Morley et al., 2013; VanEpps et al., 2021). However, consumers' psychological well-being is being neglected. While previous research shows that interpretive calorie labeling is more effective in increasing healthy choices and enhancing consumers' physical well-being (Kim et al., 2018; Reale & Flint, 2016; VanEpps et al., 2021), our findings indicate that such labeling can make consumers feel uncomfortable and guilty when making food choices. Especially when dining in a fine-dining restaurant, consumers experience cognitive dissonance, which is a kind of uncomfortable psychological state negatively related to psychological well-being (Jeong et al., 2019).

Third, this research enriches the theory and literature on cognitive dissonance by revealing the potential cognitive dissonance process elicited by different calorie labeling formats. In the context of healthy eating and prosocial behaviors, previous research shows the positive influence of cognitive dissonance on consumer behaviors (Ong, 2019; Rothgerber, 2020; Weingarten & Lagerkvist, 2023). For example, eliciting cognitive dissonance by making the animal-meat link (e.g., getting meat requires animal slaughter) explicit to consumers can reduce meat consumption (Weingarten & Lagerkvist, 2023). Unlike previous research, our research demonstrates the negative impact of cognitive dissonance on consumer responses in a restaurant context. Our findings indicate that consumers tend to experience psychological discomfort when interpretive formats disclose calorie information in fine-dining restaurants, leading to lower visit intentions and negative attitudes. These findings are in line with the arguments proposed by the cognitive dissonance theory that individuals tend to avoid information that conflicts with their desires and engage in behavioral changes to seek consistency and harmony between their internal thoughts and external realities (Book et al., 2018; Festinger, 1957; Harmon-Jones, 2019).

Last, this research contributes to sensory marketing by demonstrating the downside of visual labeling. Color-coded and physical activity-based labels are considered visual labeling formats. They include visual symbols such as traffic lights and exercise pictures for faster information processing (Kim et al., 2018). Prior research on sensory marketing demonstrates the superior effect of visual cues on consumer responses (Butcher & Pecot, 2021; Dens et al., 2011; Rebollar et al., 2017). Our research demonstrates that visual labeling formats such as color-coded and physical activity-based calorie labels can enhance consumer perceptions that the restaurant is concerned about consumers' well-being, leading to positive responses to the restaurant. However, such positive effects depend on the type of restaurant. Using visual labeling formats such as physical activity-based calorie labeling in fine-dining restaurants can make consumers feel discomfort, leading to negative responses to the restaurants.

Practical Implications

Providing calorie information on restaurant menus can promote health and a balanced diet (DiPietro et al., 2016; Rummo et al., 2023). Therefore, restaurant managers must understand how to convey calorie information (i.e., numeric, color-coded, or activity-based). We put forth the following suggestions based on our findings. First, restaurant managers should understand that overall, consumers perceive calorie information as informative and helpful. However, if they dine with the primary purpose of indulgence (vs. health), such a perception is not likely. Therefore, for restaurants where disclosure of calorie information is not mandated by law, managers should identify their target consumers' concerns for health vs. wants for indulgence. For example, people tend to seek indulgent experiences in the evening (i.e., after work) or during weekends or holidays (Abdulan et al., 2023; Khare & Inman, 2009; Parker et al., 2020). Therefore, restaurants may need to be cautious in adopting activity-based and color-coded

calorie labeling on their dinner, weekend, or holiday menus. Our findings also indicate that people tend to have more mixed opinions about activity-based calorie labeling than numeric and color-coded calorie labeling. Particularly for people with eating disorders or those who dine for indulgence and pleasure, activity-based calorie labeling may aggravate pressure and stress for fitness and hinder the enjoyment of food. Therefore, restaurant managers should identify their target consumers' characteristics and desire for indulgent menu items.

Second, this study suggests that the appropriate calorie labeling depends on the restaurant type: health-focused vs. fine-dining. Consumers tend to perceive that health-focused restaurants care for consumers' well-being when color-coded or activity-based (vs. numeric) calorie labeling is used. In the choice experiment, they prefer color-coded over activity-based calorie labeling. Therefore, restaurants with healthy menu items may consider adopting color-coded calorie labeling. By contrast, people tend to have lower levels of discomfort by numeric and color-coded (vs. activity-based) calorie labeling in fine-dining restaurants. Therefore, fine-dining restaurants may consider adopting numeric calorie labeling.

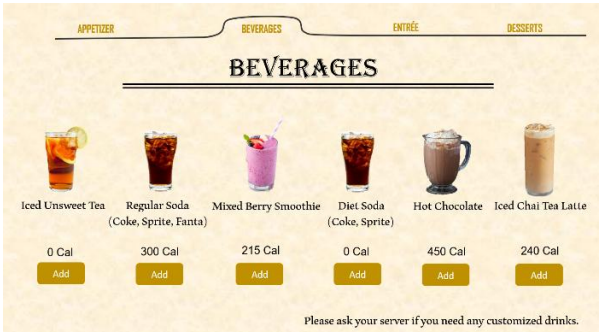
Third, this study offers suggestions for hybrid restaurants (i.e., restaurants targeting all consumers). Such restaurants may consider using color-coded calorie labeling instead of numeric or activity-based calorie labeling. This is because people tend to perceive that restaurants are concerned for customers' well-being if color-coded (vs. numeric) calorie labeling is used, and they have lower discomfort with color-coded (vs. activity-based) calorie labeling. Our findings also show that color-coded labeling is informative, with red-yellow-green color signaling calorie levels. Thus, color-coded labeling may be helpful for restaurants with extensive menus.

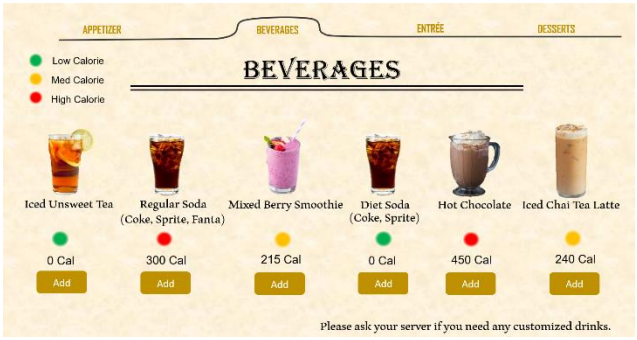
Limitations and Future Research

Several limitations of this study open avenues for future research. First, this study focuses on restaurant type (health-focused vs. fine-dining restaurant) to enhance the managerial relevance of our findings. Nonetheless, other factors may moderate consumer responses to numeric, color-coded, and activity-based calorie labeling (e.g., consumers who dine with children vs. consumers who dine alone). In addition, weather, mood, and familiarity with the restaurant types may influence consumers' decisions and visit intentions (Bujisic et al., 2019; Mattila, 2002). However, these variables are not considered in the current study and should be examined in future research. Second, this study examines consumer responses to calorie labeling in drinks (Study 1) or entrée items (Study 2-3). However, their reactions to calorie labeling may be more complex if they order a series of courses. Third, the results of Study 2 show that only interpretive calorie labeling based on physical activity led to higher levels of discomfort than numeric calorie labeling, with color-coded one showing no significant impact. This could stem from previous research findings that color-coded (vs. physical activity-based) calorie labeling is less effective in increasing awareness of caloric information and raising awareness of the negative consequences of consuming a certain amount of calories (Jin et al., 2020; Kim et al., 2018; Swartz et al., 2013). Therefore, color-coded calorie labeling is less likely to induce guilt, expected regret, and discomfort. Such an explanation can be tested in future research. Lastly, for the sake of realism, numeric information was included in interpretive calorie labeling conditions, which could potentially introduce confounding factors. For example, the color-coded and activity-based calorie labeling conditions may lead to information overload compared to simply displaying numeric information. Therefore, information overload should be examined in future research.

APPENDIX

Experimental Stimuli in Study 1





Experimental Stimuli in Study 2 and Study 3

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