

Effects of image form and model body shape in healthy eating advertisements on health perceptions and emotional responses

ABSTRACT

Mass media has become an essential channel for promoting healthy eating while preventing non-communicable diseases. However, the design forms of advertisement health messages can affect consumers' attitudes toward advertising and their health perceptions. This study adopted an experimental design to explore the effects of fruit and vegetable image design forms (anthropomorphic, photographic, and geometric) and model body shapes (no model, obese, overweight, normal, and thin) on health perceptions and emotional responses. The findings indicate that when the model's body shape was "normal," anthropomorphic fruit and vegetable designs significantly improved health perceptions; when the model's body shape deviated from health standards (e.g., thin or obese), photographic and geometric designs may weaken health perceptions. The body shape of the advertisements' models was the main factor affecting emotional responses. Advertisements with thin or obese models were more likely to cause negative emotions, while normal body shapes can maintain emotional stability. When designing healthy eating advertisements, selecting anthropomorphic fruit and vegetable images and models with normal body shapes can strengthen health perceptions while reducing negative emotional responses, improving advertising effectiveness.

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Introduction

With increasingly severe obesity and chronic diseases caused by unbalanced diets in recent years, advertisements for healthy eating have attracted significant attention from consumers and public health departments (Chrysochou & Grunert, 2014).

In Taiwan, obesity among young people is severe. Taiwan's Nutrition and Health Survey 2020 showed that the amount of physical activity among young people is generally low, and high-intensity exercise further declines as people age, increasing the risk of developing non-infectious and chronic inflammatory diseases.

Thus, effectively conveying the importance of a balanced diet and exercise has become a core issue in current health advocacy.

Fruit and vegetable images are common visual elements in healthy eating advertisements, symbolizing "nature" and "health."

However, there is a lack of in-depth discussion on the impact of fruit and vegetable image design forms (e.g., anthropomorphic, photographic, geometric) on consumers' perceptions and emotional responses. Furthermore, research suggests that adding sports images to dietary advertisements can enhance positive emotions and behavioral intentions (Chrysochou & Grunert, 2014; Dixon et al., 2015); dynamic images attract attention more than static images, evoke positive emotions (Cian, Krishna & Elder, 2014), and give products a sense of vitality (Ruiter, 2019). Sports images can also help reduce negative emotions caused by dietary warnings (Horn & Jongenelis, 2022), further influencing consumers' dietary attitudes and behaviors (Rosenblatt et al., 2019).

Therefore, this study aims to examine the design form of fruit and vegetable images, including sports elements, to analyze their impact on advertising effectiveness.

The body shape of models, as an essential visual message in advertising, also impacts consumers' perceptions of and attitudes toward the advertising content. Past advertisements often used thin models to enhance appeal, which may lead to consumers developing misunderstandings surrounding healthy body shape (Garner et al., 1980), leading to eating imbalances and psychological anxiety (Bower, 2001; Halliwell & Dittmar, 2004). Thin female models are often regarded as a negative idealized stereotype (Stephens, Hill & Hanson, 1994). Although men are less affected by this stereotype, their attitudes toward advertisements are still affected by models' body shapes (Janssen & Paas, 2014).

Based on the above, this study aims to explore the impact of fruit and vegetable image design forms and model body shapes on the effectiveness of healthy eating advertisements to analyze their effects on health perceptions and emotional responses. The findings provide specific suggestions for the visual design of healthy eating advertisements, improving advertising while providing social benefits.

Literature Review

Message Design for Healthy Eating

Increasing rates of obesity and chronic diseases caused by unbalanced diets in countries worldwide have prompted governments and companies to actively promote healthy eating (Chrysochou & Grunert, 2014). Common message design methods can be divided into health and nutritional statements (Ippolito & Pappalardo, 2002).

The former emphasizes a product's benefits on a specific body part (e.g., promoting heart health). The latter focuses on nutrients (e.g., being rich in vitamin A). Such text-based messages have been shown to promote consumers' positive feelings and purchase intentions towards a product while reducing perceptions of disease risk (Kozup, Creyer & Burton, 2003).

However, Chrysochou and Grunert (2014) found that graphical messages can attract greater attention, evoking emotional responses more effectively than simple text.

Their study divided health information into functional statements (e.g., being rich in calcium to strengthen bones), process statements (e.g., local production), and health images (e.g., sports scenes). The results indicated that health images significantly impacted consumers' health perceptions and purchase intentions.

This is because images have associative and emotional triggering power, which can evoke emotional reactions from different consumers, further enhancing advertising effectiveness.

Emotional responses are essential in advertising effectiveness. Although negative warning messages (e.g., the risk of obesity) can attract attention, they can easily stimulate consumers' shame and anxiety (Horn & Jongenelis, 2022). In contrast, positive encouragement messages (e.g., sports scenes) can induce positive emotions, such as hope and humor, enhancing consumers' willingness to engage in healthy behaviors. Horn and Jongenelis (2022) showed that health advertisements with hope and power encouraged consumers to change behaviors most effectively; animation-style encouraging advertisements can also reduce negative emotions and physical humiliation.

Although existing research has confirmed the importance of image forms in the effectiveness of healthy eating (Chu, Hetherington & Tang, 2024) and the ability of advertisements with fruit and vegetable images to increase fruit and vegetable consumption (Oke & Tan, 2022), in-depth discussions on fruit and vegetable image design forms (e.g., photos vs. illustrations) and the combination of sports images are limited. This study further analyzed the combination of graphic design forms for fruit and vegetables with sports elements to understand consumers' health perceptions and emotional responses.

Advertisement Models' Body Shape

In the visual design of advertisements, a model's body shape is not only a representative image of the product but also carries societal expectations regarding an "ideal body" (Messaris & Humphreys, 2006). Many healthy eating advertisements opt for slim models because they are considered more attractive, increasing sales (Antioco, Smeesters & Le Boedec, 2012). However, images with thin models have long been found to negatively impact consumers, especially women. An earlier study by Garner et al. (1980) indicated that thin models create unrealistic body standards, leading women to have negative evaluations of their body shapes, increasing the risk of anorexia and eating disorders (Bower, 2001; Halliwell & Dittmar, 2004).

The Social Comparison Theory, proposed by Festinger (1954) states that consumers tend to compare themselves with models in advertisements. When a model's appearance or figure is regarded as an "ideal standard," it may easily lead to consumer dissatisfaction and anxiety. Studies suggest that approximately 50% to 75% of women of normal weight believe they are overweight, while only 25% of men of normal weight feel the same (Stephens, Hill & Hanson, 1994). This gender difference reflects that women are more subject to the influence of media images.

Furthermore, the preference for a slim body size has extended to Asia, including countries and regions such as Taiwan, China, Singapore, and India (D'Alessandro & Chitty, 2011). Therefore, long-term negative perceptions of the body shapes and self-deprecation from social pressure have become risk factors for women's health (Saunders, Nutter & Russell-Mayhew, 2022).

Recent research advocates using normal and plus-size models in advertising to help consumers resonate with “a sense of closeness to themselves” (Halliwell & Dittmar, 2004; Yu, Damhorst & Russell, 2011). While this can reduce negative emotions and competitive psychology (Janssen & Paas, 2014), improve consumers’ appreciation of the models’ body shapes, brand attitudes and brand/product memories (Wallhead, Furnham & McClelland, 2025), slim models are still more mainstream (Halliwell & Dittmar, 2004). While current research has focused on the impact of model body shape on consumer attitudes, exploring its interaction with fruit and vegetable graphic design forms is limited. Thus, this study examined how models’ body shapes affect consumers’ health perceptions and emotional responses while proposing more effective advertisement design strategies.

Based on the above, this study proposed the following hypotheses. Hypothesis A: In healthy eating advertisements, the graphic design form of fruits and vegetables and the body shape of running models interact to affect consumers’ health perceptions. Hypothesis B: In healthy eating advertisements, the graphic design form of fruits and vegetables and the body shape of the running models interact to affect consumers’ emotional responses.

Research Method

This study adopted an experimental design. The design form and the models’ body shape were taken as the variables to examine the subjects’ health perceptions and emotional responses.

Sample Selection

The method for collecting healthy eating samples was based on Google’s search engine. We extensively collected designs with healthy eating images without limiting the types of commercial and public welfare advertisements or the presentation of advertisements and general illustrations. A total of 91 samples were collected.

Next, a literature review related to advertisement design was conducted. Two design experts were invited to classify graphic design forms, including one teacher with more than 15 years of graphic design teaching experience and one designer with 15 years of design experience. It was learned that healthy eating is most commonly presented by fruits and vegetables. The most common design forms are as follows: realistic (78%), geometric (20%), and anthropomorphic (18%).

Therefore, regarding fruit and vegetable image design, we selected three categories of realistic photos, and anthropomorphic and geometric illustrations for design. Three designers were asked to design images based on fruit and vegetable shapes. Next, the two design experts from the initial market survey were invited to evaluate and determine whether the image types matched (Figure 1).

The advertising layout design was simulated based on the graphic advertisement design by the Health Promotion Administration (MOHW) to promote healthy eating.

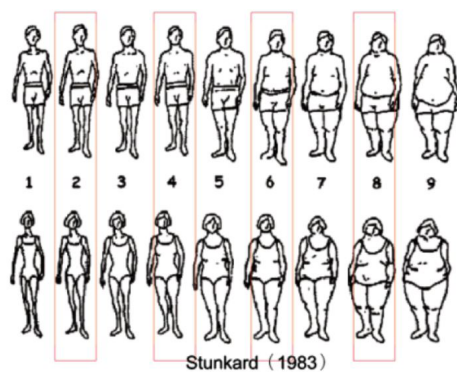
About two-thirds of the layout was dedicated to the three vegetable and fruit design forms, with the title and text placed in the center. The main headline was Healthy Eating Movement, and the subtitle, in both Chinese and English, read “Replenish Your Body’s Energy.” The nutritional information for each vegetable and fruit was placed below its respective image; a health attribute logo was positioned in the lower center. Three samples were created (Figure 1).



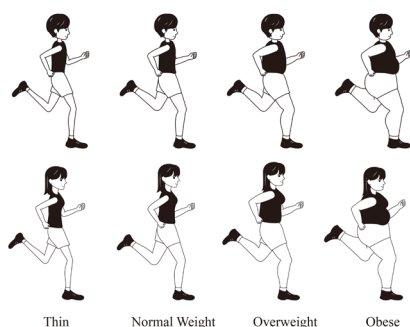
» **Figure 1:** Three design forms

The body shape design of the running model was based on the profile of male and female characters, with a black and white illustrative design (Figure 3). Stunkard's (1983) nine types of body design were adopted for the male and female models' body design (Lancki et al., 2018). The Stunkard Scale exhibits a silhouette character rating scale comprising nine men and nine women. Models increase in size, with weight indicated by numbers: 1 = underweight; 2 to 4 = healthy weight; 5 to 6 = overweight; 7 to 9 = obese/seriously overweight, as a perception of body image (Cachelin et al., 2002; Lancki et al., 2018), as shown in Figure 2.

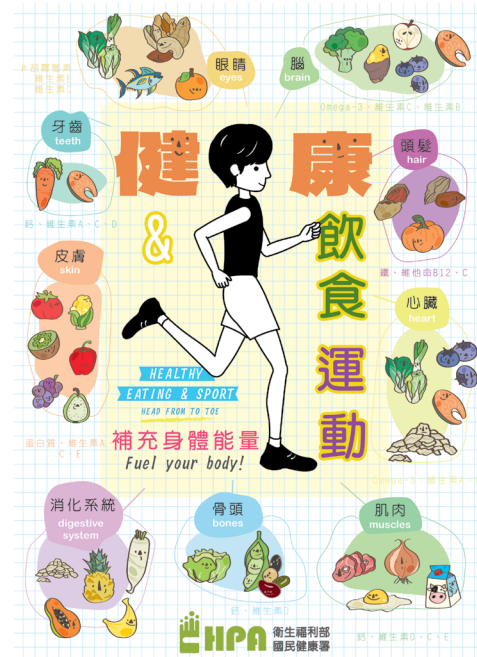
This study used numbers 2, 4, 6, and 8 to represent four types (thin, normal, overweight, and obese) as the basis for differences in model body design (Figure 3). The questionnaire was designed to ask subjects to assess their weight perception based on four body shapes (1 = extremely underweight to 7 = extremely overweight). The results showed that there were significant differences between the four model body shapes ($F=713.63$, $p=.00<.05$) of thin ($M=2.79$), normal ($M=4.10$), overweight ($M=5.62$), and obese ($M=6.60$). Regarding advertising layout, the healthy eating advertisements were the basis (Figure 1) to include running images in the middle of the text (Figure 4). This study used four body shapes for both male and female models, comprising eight model samples. Three samples featured only vegetable and fruit images, and 24 samples combined these images with model figures, totaling 27 samples.



» **Figure 2:** Stunkard (1983)'s Nine Model Body Shape



» **Figure 3:** Model Body Samples Design



» **Figure 4:** Sample Design

Questionnaire Design

In the questionnaire design, at the beginning, subjects were asked to evaluate their weight perception based on four body shapes (1 = extremely underweight to 7 = extremely overweight) to determine whether there were differences regarding the four model body shapes.

Next, subjects watched 27 advertisement samples. The questionnaire items were designed based on the evaluation by Rosenblatt et al. (2019) regarding the impact of messages and images on the perception of food health warnings. It focused on the three aspects of health perception effectiveness, negative emotional responses, and changes in behavioral motivation. The items were modified to fit this study, leading to nine items.

This study used negative emotional responses for emotional design. This is primarily because consumers' emotional responses would be affected by warning messages about healthy eating, models' appearance and body shape, and related messages with weight loss implications (Bower, 2001; Horn & Jongenelis, 2022). Therefore, this study used negative emotions to design the emotional response items. The health perception effectiveness items were designed as: "This advertisement encourages people to buy healthier food," "This advertisement makes me worry about my weight/eating habits," and "This advertisement makes me confident in my ability to maintain a healthy weight/healthy diet." The negative emotional response items were: "This advertisement makes me feel anxious," "This advertisement makes me feel sad," and "This advertisement makes me feel uncomfortable."

The items for changes in behavioral motivation were: “This advertisement makes me feel motivated to maintain a healthy weight/healthy diet,” “This advertisement makes me feel inspired,” and “This advertisement makes me feel full of hope.” The above items were measured on a 7-point scale (1 = strongly disagree and 7 = strongly agree). The subjects’ assessment of self-perceived weight was based on Horn and Jongenelis (2022). The subjects were also asked to conduct a weight assessment based on their own feelings, evaluated on a 5-point Likert scale (1 = extremely underweight and 5 = extremely overweight).

Research Subjects

The study subjects were college students. Voluntary college students were recruited online to participate in an online survey questionnaire. A total of 86 subjects (including nine males) were recruited. Each subject was instructed to complete the survey based on their feelings regarding healthy eating advertisements without knowing the research hypotheses. Subjects were asked to respond according to their perceptions.

Upon completing the survey, a 7-Eleven gift card worth NTD 100 was mailed to each subject as compensation. Personal information was not disclosed to others during the experiment, and all information regarding the subjects was deleted upon completion of the experiment.

Result

The study focused on healthy eating advertisement designs tailored to consumers with different self-perceived body weights. The actual distribution of self-reported body weight among the recruited participants was as follows: underweight ($n = 7$), normal weight ($n = 41$), overweight ($n = 33$), and obese ($n = 5$). Statistical analysis revealed no significant differences in health perception ($p = .69 > .05$), emotional response ($p = .83 > .05$), or behavioral change ($p = .65 > .05$) among these groups.

Therefore, this study did not further discuss the impact of self-perceived body weight on the effectiveness of healthy eating advertisements.

A correlation analysis was conducted to examine the relationships among health perception, emotional response, and behavioral change. The Pearson correlation analysis results indicate a significant positive correlation between health perception ($M = 3.47$, $SD = .74$) and behavioral change ($M = 3.54$, $SD = .90$) ($r = .72$, $p = .00 < .05$), suggesting that higher health perception is associated with greater behavioral change. Emotional response ($M = 2.84$, $SD = .99$) demonstrated a moderate correlation with health perception ($r = .47$, $p = .00 < .05$) and behavioral change ($r = .30^*$, $p = .00 < .05$).

Given these relationships, the discussion of results in the following focuses on the correlation between health perception and behavioral change.

Effects of Image Form and Model Body Shape in Health Perception

This study employed a two-way repeated measures ANOVA to examine the effects of different design forms (photographic, anthropomorphic, and geometric) and model body shapes (no model, overweight, obese, normal, and thin) on health perception. Table 1 presents the means and standard deviations for each condition. Overall, participants assigned the highest ratings to the “photographic-normal” ($M = 3.901$, $SD = 1.021$) and “anthropomorphic-normal” ($M = 3.971$, $SD = 1.037$) conditions, whereas the “geometric-obese” condition received the lowest rating ($M = 2.958$, $SD = 1.117$).

Multivariate tests indicated a significant main effect of design forms (Pillai’s Trace = .094, $F(2, 84) = 4.347$, $p = .016$, $\eta^2 = .063$; see Table 2). The corresponding repeated-measures ANOVA also showed a significant main effect of design form, $F(2, 170) = 5.677$, $p = .004$, $\eta^2 = .063$ (see Table 3). Mean comparisons revealed that the anthropomorphic design ($M = 3.623$, $SD = 0.084$) was associated with slightly higher health perception ratings than the photographic ($M = 3.501$, $SD = 0.085$) and geometric designs ($M = 3.494$, $SD = 0.090$). These findings suggest that anthropomorphic representations may enhance participants’ health perception more effectively than other formats, see Table 2.

The main effect of model body shapes was also significant (Pillai’s Trace = .394, $F(4, 82) = 13.316$, $p < .001$, $\eta^2 = .221$; see Table 2). The repeated-measures ANOVA likewise revealed a significant main effect of model body shape, $F(4, 340) = 24.074$, $p < .001$, $\eta^2 = .221$ (see Table 3). Further analysis revealed that models with a “normal” body shape ($M = 3.879$, $SD = 0.108$) and the “no model” condition ($M = 3.868$, $SD = 0.109$) received the highest health perception ratings, with no significant difference between them ($p = 0.909$). Conversely, the “obese” ($M = 3.065$, $SD = 0.109$) and “thin” ($M = 3.440$, $SD = 0.093$) conditions were rated lowest, with significantly lower scores than other body shapes ($p < 0.001$). These results indicate that models with a moderate body shape (i.e., “normal”) enhance health perception, whereas models at either extreme (overweight or underweight) may negatively affect participants’ health-related evaluations, see Table 3.

Additionally, the interaction effect between design forms and model body shapes was significant (Pillai’s Trace = .301, $F(8, 78) = 4.198$, $p < .001$, $\eta^2 = .040$; see Table 2). The repeated-measures ANOVA also indicated a significant interaction effect, $F(8, 680) = 3.514$, $p = .001$, $\eta^2 = .040$ (see Table 3), suggesting that the combination

of design forms and model body shapes jointly influences health perception. When the model had a normal body shape, the anthropomorphic design condition ($M = 3.971$, $SD = 0.112$) received the highest health perception ratings, significantly higher than the geometric design condition ($M = 3.766$, $SD = 0.124$, $p = 0.009$). On the other hand, when the model was obese, both the photographic and geometric designs resulted in lower health perception ratings, whereas the anthropomorphic design demonstrated a relatively smaller negative impact ($M = 3.137$, $SD = 0.107$).

These findings suggest that when the model's body shape aligns with ideal health standards (e.g., "normal"), anthropomorphic design can further enhance health perception. However, when the model's body shape deviates from health norms (e.g., "obese"), photographic and geometric designs may further diminish health perception.

Figure 5a illustrates health perception ratings across different model body shapes for each design form, showing that models with a "normal" body shape consistently received higher ratings, regardless of

Table 1
Descriptive Statistics

		Model body shapes					
		No model (M±SD)	Obese (M±SD)	Overweight (M±SD)	Normal (M±SD)	Thin (M±SD)	Total (M±SD)
Design Forms	Photographs	3.93±1.15	3.10±1.12	3.37±1.03	3.90±1.02	3.21±.92	3.50±.09
	Anthropomorphism	3.83±1.20	3.14±1.00	3.57±0.99	3.97±1.04	3.60±1.03	3.62±.08
	Geometric	3.85±1.28	2.96±1.12	3.40±.98	3.77±1.15	3.50±.93	3.49±.09
	Total	3.87±.11	3.07±.11	3.45±.10	3.88±.11	3.44±.09	-

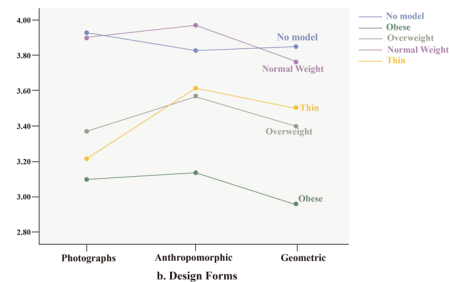
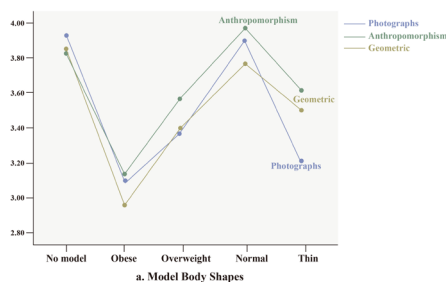
Table 2
Multivariate Tests

	Pillai's Trace	Wilks' Lambda	F	df	p	η^2
Design forms (A)	0.094	0.906	4.347	(2, 84)	0.016	.063
Model body shapes (B)	0.394	0.606	13.316	(4, 82)	0.000	.221
Interaction: A × B	0.301	0.699	4.198	(8, 78)	0.000	.040

Table 3
ANOVA Results for Main Effects

	SS	df	MS	F	p
Design forms (A)	4.490	2	2.245	5.677	0.004
Model body shapes (B)	120.507	4	30.127	24.074	0.000
Interaction: A × B	8.621	8	1.078	3.514	0.001
Error (A)	67.217	170	0.395	-	-
Error (B)	425.484	340	1.251	-	-

$p < 0.05$, $p < 0.01^*$, $p < 0.001$



» **Figure 5:** Image Form and Model Body Shape, (a) Model Body Shapes (b) Design Forms

design forms, while obese models were rated lowest. Figure 5b presents health perception ratings across design forms for each model body shape, demonstrating that anthropomorphic and photographic designs received higher ratings when they had normal or thin body shapes, whereas the geometric-obese condition received the lowest health perception ratings. These findings are consistent with the statistical results from the ANOVA, confirming that the combination of advertisement design forms and model body shapes significantly influences participants' health perception.

Effects of Image Form and Model Body Shape in Negative Emotional Responses

A two-way repeated measures ANOVA was also conducted to assess the impact of design forms and model body shapes on emotional responses. Table 4 presents the means and standard deviations for each condition. The results indicate that the “geometric-obese” (M = 3.56, SD = 1.64) and “photographic- obese” (M = 3.46, SD = 1.53) conditions elicited the highest emotional response rat-

ings, whereas the “anthropomorphic-no model” (M = 2.171, SD = 1.168) and “geometric-no model” (M = 2.174, SD = 1.247) conditions had the lowest ratings. The main effect of design forms was not statistically significant (Pillai’s Trace = 0.065, F(2, 84) = 2.904, p = 0.060, η^2 = 0.041), suggesting that design forms alone did not significantly affect emotional responses. However, the main effect of model body shapes was significant (Pillai’s Trace = 0.460, F(4, 82) = 17.470, p < 0.001, η^2 = 0.266), indicating a substantial influence of model body shapes on participants' emotional reactions. Additionally, the interaction effect between design forms and model body shapes approached significance (Pillai’s Trace = 0.173, F(8, 78) = 2.040, p = 0.052, η^2 = 0.023), suggesting a potential joint influence of these factors on emotional response (see Table 5).

Further pairwise comparisons among model body shapes revealed that the “obese” condition exhibited the greatest mean differences compared to other body shapes, particularly when contrasted with the “no model” condition (-1.254, p < 0.001) and the “normal” model condition (1.089, p < 0.001).

Table 4
Descriptive Statistics

		Model body shapes					
		No model (M±SD)	Obese (M±SD)	Overweight (M±SD)	Normal (M±SD)	Thin (M±SD)	Total (M±SD)
Design Forms	Photographs	2.31±1.15	3.46±1.53	2.84±1.31	2.36±1.16	3.12±1.58	2.82±.11
	Anthropomorphism	2.17±1.17	3.40±1.62	2.61±1.20	2.34±1.07	2.77±1.41	2.66±.11
	Geometric	2.17±1.25	3.56±1.64	2.93±1.33	2.45±1.27	2.86±1.41	2.80±.12
	Total	2.22±.10	3.47±.16	2.80±.12	2.38±.12	2.92±.15	-

Table 5
Multivariate Tests

	Pillai’s Trace	Wilks’ Lambda	F	df	p	η^2
Design forms (A)	0.065	0.935	2.904	(2, 84)	0.060	.041
Model body shapes (B)	0.460	0.540	17.470	(4, 82)	0.000	.266
Interaction: A × B	0.173	0.827	2.040	(8, 78)	0.052	.023

Table 6
LSD Post Hoc Test

Comp.	MD	p-Value	Comp.	MD	p-Value
No model vs Obese	-1.254	0.000	Obese vs Normal	1.089	0.000
No model vs Overweight	-0.576	0.000	Obese vs Thin	0.556	0.000
No model vs Normal	-0.165	0.041	Overweight vs Normal	0.411	0.000
No model vs Thin	-0.698	0.000	Overweight vs Thin	-0.123	0.350
Obese vs Overweight	0.678	0.000	Normal vs Thin	-0.534	0.000

MD = mean difference

A significant difference was also observed between the “normal” and “thin” model conditions ($-0.534, p < 0.001$). These findings suggest that model body shapes significantly modulate emotional reactions, corroborating the significant main effect observed in Table 6.

Conclusion and Suggestions

This study explored the impact of fruit and vegetable image design forms and model body shapes on consumers' health perceptions and emotional responses. The results indicate that the two variables interacted with health perceptions. Anthropomorphic and photographic fruit and vegetable designs matched with models of normal body shapes significantly enhanced consumers' health perceptions, particularly in anthropomorphic design.

However, when the model's body shape deviated from health standards (e.g., being thin or obese), geometric design forms weakened health perceptions, confirming Hypothesis A. In other words, the graphic design form of fruits and vegetables and the model's body shape interacted to affect consumers' health perceptions. Normal body shapes can best promote consumers' health perceptions. Although a thin body shape is often pursued as an ideal body type in contemporary society, people's health perceptions of this body shape remain relatively low. This is consistent with Yu et al., (2011).

However, this study also found that when thin body shapes were configured with illustration (geometric and anthropomorphic) forms, health perceptions improved. Perhaps the illustration form can distract people from reality and induce viewers to associate different motivations, thereby triggering a more positive feeling (Chrysochou & Grunert, 2014). However, this did not occur in the obese body types. Thus, exercise and food images do influence health behaviors (Wu et al., 2022), and different body shapes and fruit and vegetable design forms lead to different acceptability.

The emotional response analysis showed that the shape of the model's body was the main factor affecting emotional responses, and Hypothesis B was not supported. The subjects' reactions to underweight or obese models included significant negative emotions such as anxiety and discomfort; normal body shapes triggered a more stable emotional response. Notably, although thin models are often seen as a means of attracting consumers' attention (Antioco, Smeesters & Le Boedec, 2012), this study found that they may trigger negative emotions, echoing the findings of Janssen and Paas (2014) and Halliwell and Dittmar (2004).

Moreover, compared with photos and geometric forms, when the four body types were configured with anthropomorphic forms, negative emotions were reduced.

Previous studies suggest that anthropomorphic fruits and vegetables make people naturally find them cute and friendly, and especially showing the anthropomorphic advantages in advertising can improve the views and preferences of advertising products than those without anthropomorphic design. Anthropomorphism can provide consumers with a sense of social connection and mitigate the negative feelings associated with social exclusion. (Mourey, Olson & Yoon, 2017).

A model's body shape is the main factor in negative emotions, because being too thin or obese could be a health issue, which can make people feel anxious, sad and uneasy (Styk, Wojtowicz & Zmorzynski, 2023).

Perhaps models with an "ideal body shape" (being lean) are attractive and can have better sales efficiency (Antioco, Smeesters & Le Boedec, 2012; Tsawaab, 2023). In fact, they can lead to consumers' negative emotions in healthy eating advertisements. Therefore, how to apply model body shapes in health or fashion appeals is something worth further discussing in the future.

Overall, anthropomorphic fruits and vegetables associated with models of normal or overweight body shapes in healthy eating advertisement designs can effectively enhance health perceptions and reduce negative emotions. Moreover, consumers tend to think that extreme body shapes (thin or obese) symbolize unhealthy characteristics, making it challenging for even positive behaviors such as running to reverse this impression.

Regarding practical suggestions, excessively abstract images and models with extreme body shapes should be avoided in advertisement design. We recommend using anthropomorphic designs and models with normal body shapes to enhance advertising effectiveness. Moreover, designers can use color contrast, situational plots, or other techniques to further optimize consumers' emotional responses.

Regarding research limitations and future directions, this study primarily explored the impact of static advertising images on health perceptions and emotional responses, without examining dynamic media or other interactive design forms.

Future research should be extended to explore the regulatory role of different visual elements (e.g., color, text messages, and sports situations) and audience characteristics (e.g., gender and age) on advertising effectiveness, testing the applicability of the results across cultural and market contexts.

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