



DIGITAL ILLUSTRATION AND ITS IMPACT ON CONSUMER PERCEPTION OF HEALTHIER FOOD PRODUCTS

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Abstract: *The role of packaging in influencing consumer perceptions is widely recognized within the domain of graphic communications. It is particularly effective in encouraging consumers to opt for healthier snack alternatives by incorporating visually appealing design elements, such as digital illustrations. This study employed an online survey with 116 Croatian participants with a diverse age range (18-71 years) to investigate the impact of digital illustrations on the attractiveness of packaging and product perception. Participants evaluated four different packaging samples for new healthy snack bars in two flavors using a 5-point Likert scale. The presence of digital illustrations served as the independent variable, while the packaging shape, size, composition, and typefaces were held constant. A choice task between packages with and without illustrations was also conducted. The results indicated the surprisingly infrequent consumption of this type of food product among participants. Additionally, the results on attitudes towards the importance of design suggested that the majority of respondents consider the packaging graphic design as a relevant product attribute, emphasizing its substantial impact on product perception. The implications regarding the role of digital illustrations in promoting healthier product choices were discussed, highlighting the potential benefits of deliberate packaging design in encouraging consumer preferences for healthier food options.*

Key words: illustration, packaging, snack, graphic design

1. INTRODUCTION

The role of packaging in influencing consumer perceptions is widely recognized within the domain of marketing and visual communications, and food product category is not an exception. For instance, many studies have demonstrated how packaging design (Hamlin, 2016; Lidón, Rebollar, Gil-Pérez, Martín, & Vicente-Villardón et al., 2018), color schemes (Marques da Rosa, Spence, & Miletto Tonetto, 2019), and imagery (Kovačević, Mešić, Užarević, & Brozović et al., 2022b; Rebollar et al., 2017; Timmerman & Piqueras-Fizman, 2019) significantly affect consumers' evaluation of food products. This is particularly evident in the case of snack foods, where unhealthy options are often preferred. The previous research indicates that consumers frequently choose unhealthy snacks, driven by taste and convenience, rather than health considerations (Hartmann, Siegrist, & Van Der Horst, 2013). Thus, it not surprising that they often prioritize taste over health when selecting food, particularly under certain conditions such as a lack of time (Köster, Buabang, Ivančir, & Moors et al., 2023). This tendency to make poor food choices under time pressure can, however, be influenced by design. A study on fruit snacks packaging showed that front-of-package visuals may be a relevant aspect of the packaging when making quick buying decisions (Abrams, Evans, & Duff, 2015) and that packaging design may play a significant role in encouraging better product choices (Sabo, Bečica, Keleš, Kovačević, & Brozović et al., 2017) and has a potential to effectively communicate taste of the product (Gil-Pérez, Rebollar, Lidón, Martín, & Trijp et al., 2019; Veflen, Velasco, & Kraggerud, 2023). Research on communication aspect of packaging suggests that people generally need more visual elements to understand the packaging messages, with a combination of text and illustration being the most effective approach (R. W. Y. Wang & Chou, 2010). As demonstrated in a study (Underwood, Klein, & Burke, 2001), illustrations may be particularly beneficial for lesser-known brands. However, illustrations do not always have a positive effect on information comprehension, especially among older consumers (Liu, Kemper, & McDowd, 2009). Therefore, the purpose of this study was to test the influence of digital illustration on the packaging for an unknown healthy snack brand in order to explore the potential of packaging visual design in encouraging consumer preferences for healthier snack options.

2. METHODOLOGY

2.1 Participants

A total of 116 Croatian participants were selected for this study, who voluntarily participated in a questionnaire. The inclusion criteria for participation were age above 18 and internet access. Of the total, 66% were female, 33% were male, and 1% chose not to specify their gender. The age range of participants was 18 to 71 ($M = 30.70$, $SD = 14.56$).

2.2 Design of the packaging variants

The study employed a 2x2 experimental design, in which participants were exposed to packaging designs varying across two factors: flavor and visual design. A total of four distinct packaging designs were created by manipulating these two variables. The first factor, flavor, consisted of two distinct tastes (namely, banana and peanut). We included two product flavors in the analysis since consumer preferences for healthy snacks sometimes differ across products, even when products offer comparable health advantages (Okpiaifo, Dormoy-Smith, Kassas, & Gao et al., 2023). The second factor, visual design, also had two categories: a design without illustration and a design with illustration. The illustrated versions used a digital depiction of the main ingredient which represented a particular taste. The presence of digital illustrations served as a main independent variable, while the packaging shape, size, composition, and typefaces were held constant. Therefore, the versions without illustration contained identical elements to the design with illustrations. In the area designated for illustrations, a geometric, abstract pattern was applied to prevent the non-illustrated space from appearing incomplete and to ensure that the packaging reflected a typical commercial product aesthetic, as typical label designs are generally perceived as more aesthetically attractive (Celhay & Trinqucoste, 2015). Finally, four unique packaging designs were created (Figure 1); P1 (taste: banana, visual design: without illustration), P2 (taste: banana, visual design: with illustration), P3 (taste: peanut, visual design: without illustration), and P4 (taste: peanut, visual design: with illustration).

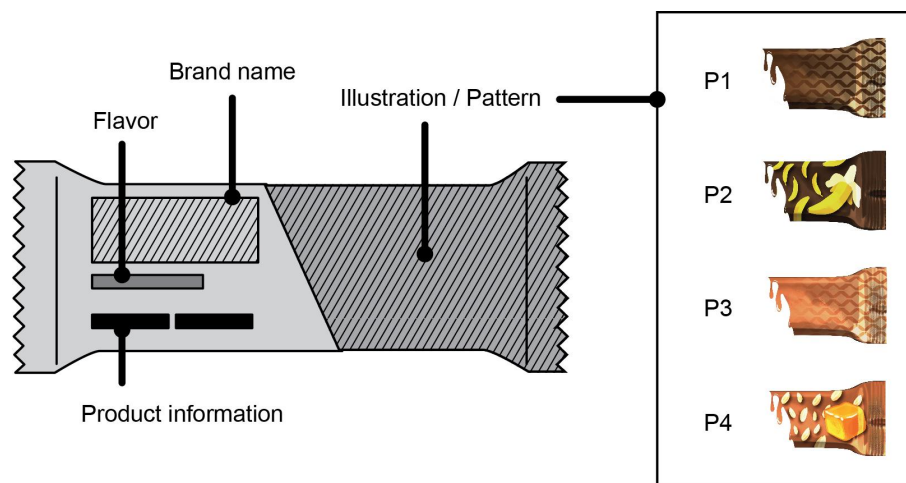


Figure 1: Design of the packaging variants used in the experiment

2.3 Procedure

The study employed an online questionnaire to collect data on snack bars consumption habits and the participants' perception of packaging visual design. The survey was developed using Google Forms. Data from the questionnaire were collected and stored securely on a cloud-based server. It consisted of demographic information, an evaluation of packaging designs, and a choice task. The questionnaire included ten questions in total, and the respondents were required to answer all the questions in order to complete the survey. All of them were informed about the purpose of the study and provided their informed consent.

Participants were first asked demographic questions regarding their age, gender, and how often they consume healthy snack bars. Response options were: never, rarely, once a month, and once a week.

Following this, they were presented with four different packaging designs. They were asked to evaluate the level of the snack attractiveness using a 5-point scale. After the evaluation, the participants completed a choice task in which they were shown the packaging designs without illustration and designs with illustration, and were asked to indicate which one they would purchase. Next, the participants were asked how important they consider packaging design to be. The final question was: "Do you think that packaging visual design can improve the perceived quality of a healthy snack bar?" with two response options (yes or no). There was no time limit for completing the questionnaire.

Statistical analyses were performed by using SPSS Statistics. For the purposes of statistical testing, a significance level of 0.05 was set as the threshold for determining the statistical significance.

3. RESULTS

The analysis began by examining the distribution of participants based on how frequently they consume snacks and the importance they attribute to packaging visual design. Participants were categorized based on their reported frequency of healthy snack bar consumption. A total of 56.03% of the participants reported eating healthy snacks bar rarely, while 26.72% reported they never eat them. 13.79% reported eating healthy snack bars once a month and only 3.45% reported eating the bars once a week. To assess participants' attitude toward the importance of packaging design, responses were collected as a binary variable (important or not important). 50.86% participants identified design as an important factor, whereas 49.14% participants did not consider it to be of significant relevance. When asked "Do you think that illustrations on packaging can improve the perception of product quality?", a remarkable 83.62% of respondents indicated "Yes". Among the remaining participants, 8.62% responded "No", while 7.76% indicated "I don't know".

3.1 Choice task

In the choice task, the participants selected between the packaging without illustration and the packaging with illustration as their preferred option. A Chi-square test was conducted to examine the effect of illustration on participants' choice between two packaging designs. The results revealed a significant effect of the packaging visual design, $\chi^2(1) = 52.45$, $p < 0.001$, indicating that the illustration significantly influenced participants' choices (Figure 2). Specifically, the packaging with illustration was preferred over the packaging without illustration, suggesting that the presence of digital illustration positively affected participants' selection. To examine whether the participants' age and their attitude toward the importance of packaging design moderated the relationship between the illustration and participants' choices, we included these variables in the analysis. The analysis showed no significant effect of age, $\chi^2(1) = 0.619$, $p = 0.43$, indicating that the age of participants did not significantly influence their choice between two packaging designs. Similarly, the participants' attitude toward the importance of design also did not significantly affect participants' choices, $\chi^2(1) = 3.38$, $p = 0.07$.

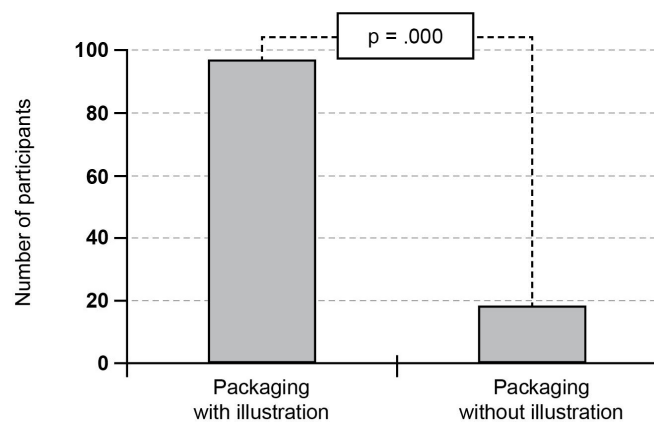


Figure 2: Results of the choice task

3.2 Attractiveness evaluation

Participants' responses were measured across two independent variables: flavor (banana versus peanut) and visual design (without illustration versus with illustration). A repeated measures analysis of variance (ANOVA) was conducted to investigate the effects of flavor and visual design on the attractiveness ratings. The analysis revealed a significant main effect of visual design, $F(1, 115) = 62.99, p < 0.001$, indicating that the packaging with illustration was perceived as more attractive ($M = 3.61, SE = 0.09$) than the packaging without illustration ($M = 2.86, SE = 0.08$). Figure 3 shows this effect. In contrast, there was no significant difference in the attractiveness between two flavors, $p = 0.50$. The interaction between flavor and visual design was also non-significant, $p = 0.15$, suggesting that the effect of illustration was consistent across both product types.

The participants' age and their attitude toward the importance of packaging design were included as between-subject factors in the analysis to examine their influence on the results of the packaging attractiveness evaluation. The results showed no significant main effect of age or attitude on the participants' responses, $ps > 0.05$. Furthermore, there were no significant interactions between these factors and the within-subject variables, indicating that neither age nor attitude toward the importance of packaging design moderated the effects of packaging visual design.

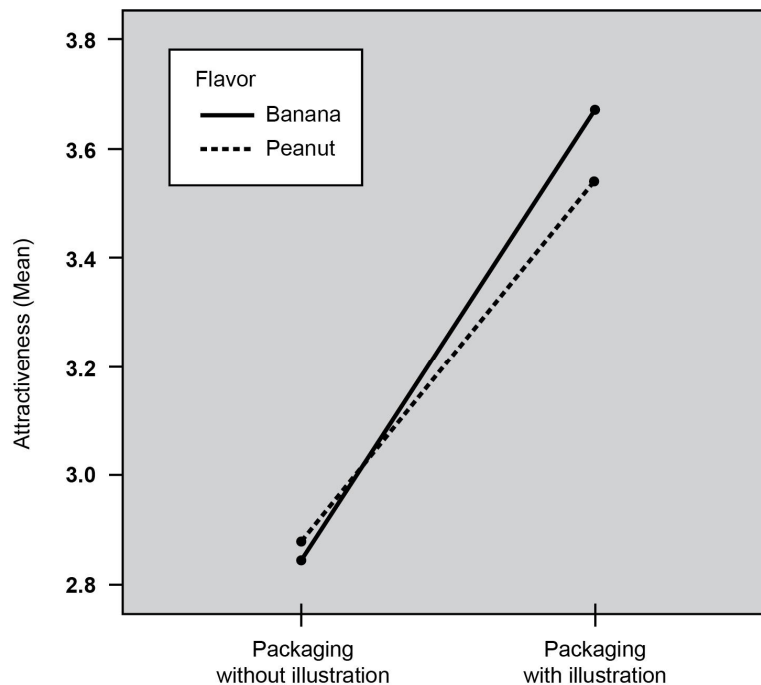


Figure 3: The effect of illustration on perceived attractiveness

4. DISCUSSION

The first part of our study, which explored the frequency of healthy snacks consumption among consumers from different age groups, indicated the surprisingly infrequent consumption of this type of food product among participants. This validated the need for more specific inquiries in our study, where the focus was on exploring the influence of digital illustration on their perception of the snack packaging designs. The main finding is that the packaging with illustration was perceived as more attractive than the non-illustrated packaging, which aligns with other studies conducted in the area of the food packaging design. For example, a study of wine packaging design (Boudreaux & Palmer, 2007) found that, among illustration, layout, and color, the illustration had the strongest effect on consumer responses. The positive effect of illustrated versions of packaging in our study can be attributed to their vivid and colorful design, which can be more appealing to consumers (Pires & Agante, 2011). The significance of color saturation was also validated in a study involving participants who were exposed to pictures of snack and drink products (Kunz, Haasova, & Florack, 2020). Their results demonstrated that displaying product images in grayscale reduced the

perceived correlation between healthiness and tastiness. Still, it should be acknowledged that these findings may not be entirely applicable to all cases. As reported in (Schifferstein, Lemke, & de Boer, 2022) the complexity of images may trigger additional, unintended interpretations, which, in some cases, can negatively affect the overall assessment of the packaging.

A surprising result in our study is that neither age nor the participants' attitude toward the importance of packaging design moderated the effects of illustration on the packaging design. This is in contrast with previous research which demonstrated that age may influence packaging evaluation under certain conditions. For example, the findings from a study which compared the responses from different age groups (Vila-López, Küster-Boluda, & Sarabia-Sánchez, 2017) suggest that the form and visual presentation of healthy products are more influential for young adults than for adolescents. In a study on packaging-based odor associations (Kovačević, Kupres, Šepat, & Brozović et al., 2022a), it was found that younger participants were more sensitive to design variations compared to mature participants.

Additional results from the choice-task in our study confirmed the superiority of the illustrated packaging designs over non-illustrated ones. Our results are consistent with those of a study (H. Wang, Ab Gani, & Liu, 2023) which showed that among the several design elements, image stood out as the most influential factor in driving consumer purchase decisions. This effect is especially pronounced when concrete (F. Wang, Wang, & Cho, 2022) or realistic images are used (Kovač, Kovačević, Bota, & Brozović et al., 2019). The findings align with earlier study, which highlight the importance of appropriate illustration, especially for instant coffee packaging, in shaping consumer preferences (Kobayashi & Benassi, 2015).

Finally, the results from both evaluation questions and choice-task are in accordance with the participants' positive responses to the question of whether they believe that design can enhance the perception of the product within the packaging. Considering all the study results, it can be concluded that the participants demonstrated consistency in their responses across various question types, strongly supporting the positive impact of the illustrated packaging design on the perceived attractiveness of the food product.

5. CONCLUSIONS

Our results on attitudes towards the importance of design suggested that the majority of our respondents consider the packaging visual design as a relevant product attribute, emphasizing its significant impact on product perception. This may indicate that digital illustrations on the packaging for snack bars can play a significant role in promoting healthier product choices, highlighting the potential benefits of deliberate packaging design in encouraging consumer preferences for healthier food options, regardless of their age. However, this study has certain limitations. First limitation is a relatively small sample group, which may have impacted generalizability of the results. Second limitation could be an online format of the questionnaire, which could have influenced answers dependent on respondents' subjective interpretation of the questions. These methodological constraints suggest that caution should be taken when applying these findings to a wider array of products or different populations.

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