CHAPTER 7

The impact of portion size labeling on popcorn purchases in the cinema

Willemijn M. Vermeer
Ingrid H.M. Steenhuis
Franca H. Leeuwis
Michiel de Boer
Jacob C. Seidell

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**ABSTRACT**

**Background:** Portion size labeling might help consumers to select more appropriate portion sizes of snacks and drinks. This experimental field study evaluated the impact of portion size labeling on popcorn size choices in a cinema.

**Methods:** Three types of portion size labeling (i.e. *Calories and Bicycle* labeling, *Normal, Large, Extra large* labeling, and *Portions per Container* labeling) were compared to each other and to a control condition. The experimental manipulation consisted of information displayed above the food and drink counter. The main outcome variable was popcorn sales figures.

**Results:** Compared to the control condition, the likelihood to choose the smallest container was highest in the *Portions per Container* condition (OR = 1.54, p = .02, CI: 1.08 0- 2.19). Furthermore, the average purchase of calories was lowest in the *Portions per Container* condition (362 calories), followed by 374 calories in the *Calories and Bicycle* condition, and 390 calories in the control condition. The likelihood to purchase popcorn was comparable in all study conditions. *Normal, Large, Extra large* labeling appeared unfeasible to implement in this study.

**Conclusion:** *Portions per Container* labeling seemed most effective in helping cinema visitors to limit the amount of calories from popcorn during a cinema visit. Since we did not collect consumer data, it cannot be ruled out that the characteristics of the cinema visitors confounded the relation between portion size labeling and popcorn container choices. Therefore, more research including both sales and consumer data is recommended.

Key words: Portion sizes; Food labeling; Obesity prevention; Environmental interventions
INTRODUCTION

Compared to former times, people currently eat much more foods and drinks out of their home environment. As an illustration, between 1978 and 1996 the consumption of food prepared away from home increased from 18% to 32% of the total energy intake in the US[1]. Foods that are prepared out of home often contain more calories and (saturated) fat than home cooked foods [1, 2]. Furthermore, food portion sizes in (fast-food) restaurants and food outlets often are two to eight times larger than standard servings as defined by the US Department of Agriculture [3]. Hence, it is no surprise that eating away from home is positively associated with BMI [4-6].

Eating out of home is for an important part driven by the fact that (especially energy-dense) food is widely available. As a result of current marketing strategies such as diversification, no-body is surprised to find cookies in drugstores or a diverse array of food outlets and shops in train stations. Also, for many people recreational or cultural activities, such as going to the movies, are currently unthinkable without consuming soft drink and/or snacks such as popcorn. Moreover, as many people consider such activities as special occasions, they feel it is appropriate to treat themselves rather than focusing on healthy eating [7].

Improving the nutrition environment in food outlets such as (fast-food) restaurants or cinemas, is therefore an important goal of many prevention strategies aiming to reduce the prevalence of overweight and obesity [2, 8]. One route to improve the nutrition environment is to focus on portion sizes. Portion sizes have grown in the past decades [9-11] as a result of which many consumers have become “portion distorted”. This means that they have difficulties with selecting portion sizes that are appropriate for their energy requirements [12, 13]. In addition to portion distortion, people tend to eat more when being served larger sizes of food [14-16]. This effect has even been found in the case of stale popcorn [17].

Portion size labeling could both be a promising and a feasible intervention to help people regulate their food intake [7, 18, 19]. Especially in Europe, portion size labeling is currently not a widespread practice, and a standard format does not yet exist. A pilot study
on the most effective format for portion size labeling indicated that providing consumers with a reference portion size was most promising [20]. However, the few experimental studies that have explored the effectiveness of portion size labeling on the consumption of snacks, meals, and soft drinks provide inconclusive results [21, 22, 23]. This is presumably caused by the fact that these studies had a low statistical power or focused on consumption rather than choice behavior. Solely focusing on consumption behavior might provide insufficient insight since people find it difficult to regulate the amount they consume once the food is served [19, 24]. Consequently, portion size labeling might be more effective at the moment of choice (e.g. at the counter) than at the moment of consumption (e.g. once the food is served).

In the current study, the impact of portion size labeling on popcorn purchases in a cinema was assessed. This setting was chosen because a cinema is a real world setting in which a diverse range of people can be found. Popcorn was chosen as test food because it contains many calories and is available in multiple and large sizes. In Dutch cinemas for instance, popcorn containers vary from 32oz to 170 oz with a caloric value that can mound up to 1318 calories (in the case of sweet popcorn [25]). This study evaluated the impact of three portion size labeling formats on sales figures of popcorn containers.

**METHODS**

**Brief overview and labeling formats**

This experimental field study with three experimental conditions and one control condition took place on four subsequent Saturday evenings. Three types of portion size labeling were compared to each other and to a control condition. The first labeling format outlined the number of calories per container and equaled this to the number of bicycle minutes that were necessary to burn the calories (i.e. *Calories and Bicycle* condition). The second labeling format consisted of fast-food-style labeling that ranged from normal to extra large (i.e. *Normal, Large, Extra large* condition). This labeling format was identical to the current labeling in the cinema. However, for the purpose of this study the size that was normally labeled as “normal” was shifted to large. The third labeling advised on the number of
persons that could share one container (i.e. Portions per Container condition). In the control condition, no display with portion size labeling was available.

In each study condition, three container sizes were available: 32 oz (201 calories), 64 oz (402 calories), and 85 oz (603 calories). The experimental manipulation consisted of information displayed above the food and drink counter.

**Recruitment procedures**
First, various cinema chains were telephoned to request the name of the manager. Next, letters were sent to six cinemas introducing the study. After a week, the managers were contacted by telephone. Two cinemas agreed to participate. However, for practical reasons one cinema was selected for the execution of the study. This five theatre cinema was located in a small town in the north-west of the Netherlands and had an average of 3000-4000 visitors per week.

**Data collection procedures**
On each of the three evenings on which the experimental conditions were planned, a member of the research team visited the study location in order to assist with the placement of the display material and to observe whether the study protocol was followed. Upon arrival of the member of the research team, the manager provided the cash register data for that day until 6 PM. The collected cash register data consisted of the total number of popcorn containers that were sold (per size), the sales figures of other snacks and drinks, and the number of visitors for that day. After the cash register data were collected, the display material was installed. At the end of the evening, the cash register data were recorded again. Since the displays were only installed in the evenings, the cash register data that were collected at 6 PM were subtracted from the evening cash register data. During the evening on which the control condition took place, the cash register data were collected by telephone.
Data analysis
To assess the impact of labeling on the popcorn size choices (among visitors who bought popcorn), the sales numbers were calculated per study condition for each popcorn size. Then, the distribution of the three sizes was calculated and compared between the study conditions with a chi square analysis. Furthermore, logistic regression analyses were run in order to assess the impact of labeling on the likelihood to either choose the smallest or the largest popcorn container. Descriptive statistics were used to calculate the average number of calories per popcorn purchase per condition.

Furthermore, in order to assess whether the labeling would discourage cinema visitors to buy popcorn at all, the percentages of cinema visitors who purchased popcorn in relation to the total number of visitors per evening were calculated for all study conditions.

Last, total sales figures of the remaining product categories were calculated for all study conditions so as to assess whether cinema visitors would compensate for selecting smaller portions of popcorn, by eating or drinking other products. The measurements with respect to the likelihood to purchase popcorn and the sales figures of the remaining product categories were done at the group level, and could therefore not be tested for significance.

RESULTS
Implementation
The study protocol was followed in the Calories and Bicycle condition and the Portions per Container condition. However, a few hours after the displays in the Normal, Large, Extra large condition were installed they were removed by the cinema staff. Consequently, there are no data available to assess the impact of this labeling format.

Impact of labeling on size choices
In the Calories and Bicycle condition, 876 people visited the cinema, and spent on average €3.63 per person. The number of cinema visitors was 1072 in the Portions per Container condition, and the average spent €2.58. In the control condition, there were 1092 visitors with an average spending of €3.62.
Among cinema visitors who purchased popcorn, a significant effect of labeling on size choices was found, \( p = .01 \), see Table 7.1. Compared to the control condition, the likelihood to choose the smallest container was higher in the *Portions per Container* condition with OR = 1.54, \( p = .02 \), CI: 1.08 - 2.19. However, in the *Calories and Bicycle* condition the likelihood to choose the largest size was smaller compared to the control condition with OR = .55, \( p = .02 \), CI: .33 - .90.

Among the visitors who purchased popcorn, the average purchase of calories was lowest in the *Portions per Container* condition (362 calories), followed by 374 calories in the *Calories and Bicycle* condition, and 390 calories in the control condition.

Last, the amount spent on popcorn per cinema visitor was comparable between the study conditions, with €0.62 in the *Calories and Bicycle* condition, and €0.66 in the other conditions.

### Table 7.1 Cup size choices (in %) in all study conditions

<table>
<thead>
<tr>
<th>Container sizes</th>
<th>Study conditions</th>
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<tbody>
<tr>
<td></td>
<td>Calories and bicycle minutes</td>
<td>Portions per container</td>
<td>Control condition</td>
<td></td>
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<tr>
<td>32</td>
<td>25.9</td>
<td>35</td>
<td>26</td>
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<tr>
<td>64</td>
<td>62.1</td>
<td>50</td>
<td>54</td>
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<td>85</td>
<td>12.1</td>
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\( \chi^2 (4) = 13.98, p = .01 \)

**Impact of labeling on the likelihood to purchase popcorn**

In the control condition, 26.1% of the visitors purchased popcorn. This did not differ much from the *Calories and Bicycle* condition (25.6%) and the *Portions per Container* condition (27.9%).
Impact of labeling on sales of other snacks and drinks

The average amount spent per visitor on snacks and drinks other than popcorn was: €2.96 in the control condition, €3.01 in the Calories and Bicycle condition, and €1.92 in the Portions per Container condition.

DISCUSSION

In this study different formats of labeling were tested aiming to reduce the amount of popcorn that people consume in the cinema. The study results show that labeling popcorn (either in terms of the number of calories per container in relation to the number of bicycle minutes that are necessary to burn the calories, or the number of portions per container) leads to healthier portion size choices than when no labeling was present. More specifically, among the cinema visitors that purchased popcorn, Portions per Container labeling was associated with a higher likelihood of selecting the smallest size than in the control condition. However, Calories and Bicycle labeling reduced the likelihood to choose the largest size compared to the control condition. When looking at the average number of calories per popcorn purchase, Portions per Container labeling was associated with a lower number of calories (i.e. 28 calories) compared to the control condition. This result should however be interpreted with caution, as it could not be tested for statistical significance due to the fact that the number of calories per purchase was not normally distributed.

Although labeling had an impact on the amount of popcorn per purchase, labeling did not seem to have an effect on the likelihood to buy popcorn. This means that cinema visitors were not less (or more) likely to buy popcorn when labeling was present in the cinema. Furthermore, the average amount per cinema visitor that was spent on snacks and drinks other than popcorn hardly differed between the control condition and the Calories and Bicycle condition. However, the average amount was about 1 euro lower in the Portions per Container condition. This signifies that, if anything, the labeling format that seemed most promising in reducing the caloric intake from popcorn, did not encourage cinema visitors to purchase other snacks instead of popcorn.
It should be noted that the impact of labeling on the number of calories per popcorn purchase seems small. On the other hand, people make on average 200 consumption decisions per day [26], and adding up all the minor caloric reductions likely has a major impact on the long term. Nevertheless, larger effects of labeling are welcome. A recent study has shown that adding information with respect to the recommended daily caloric requirement increases the effect of calorie labels [27]. It would be interesting to study whether this is also the case with portion size labeling.

With respect to the feasibility of implementing this intervention, it is worth mentioning that although the cinema manager approved of all the labeling formats before the start of the study, the display consisting of the Normal, Large, Extra large labeling was removed during the study. The cinema manager indicated that he did not consider this type of labeling feasible to implement because it was confusing for the cinema visitors and his employees. After the study, the cinema manager was also asked to give his opinion about the two other labeling formats. He had a preference for the Calories and Bicycle because he considered the information that was provided as objective. In contrast, he thought that the Portions per Container labeling was too steering. Furthermore, the manager indicated that an advantage of displaying the labels in his cinema was that it would raise awareness among consumers, and that consumers nowadays demanded transparency and information provision. On the other hand, if the awareness that was raised by the labeling would lead to smaller portion size choices, the manager indicated that he would not be willing to permanently display the labels.

This study, as is often the case with studies that are conducted in field settings, has some methodological limitations. Most importantly, since we did not collect consumer data, it cannot be ruled out that the characteristics of the cinema visitors confounded the relation between portion size labeling and popcorn container choices. It is for instance possible, that the cinema visitors that were confronted with Portions per Container labeling were more health orientated or less hungry than participants in the other conditions. Nevertheless, we tried to keep the cinema visitors as comparable as possible between the conditions by conducting the study on four subsequent Saturday evenings in a cinema playing various types of movies simultaneously.
Based on the results of this study, the labeling format that indicates the number of portions per container seemed most effective in helping cinema visitors to limit the amount of calories from popcorn during a cinema visit. Furthermore, Portions per Container labeling did not lead to increased sales of foods and drinks other than popcorn. In other words: compensatory food intake as a result of the portion size labeling does not seem to have occurred. The results of this study are in line with a previous (questionnaire) study in which we evaluated the impact of different labeling formats on portion size choices of soft drink [20]. In another study that we conducted, no effects of this labeling format were found [23]. The results of the latter study might however be explained by a lack of statistical power, and by the fact that the majority of the participants did not have a habit of drinking soft drinks.

Although the results of this study should be interpreted with caution, they seem to be in line with previous research that also indicated that a labeling format in which the amount of (reference) portion sizes was indicated was most promising [20]. It is therefore recommended to further test the impact of Portions per Container labeling on choice and consumption behavior over a longer time frame. For future studies, it is also recommended to combine the sales data with consumer data in order to rule out alternative explanations and to assess if the effect of labeling on choice behavior is moderated by consumer characteristics such as sex, weight status and dietary restraint.

Another suggestion is to test the effectiveness of Normal, Large, Extra large labeling, as this seems a subtle manner to set a smaller consumption norm that was unfortunately not adequately tested in this study. A recent study has demonstrated that labels suggesting items to be smaller (vs. larger) in the size range associated with that item lead consumers to eat more [28]. Because consumers have hedonic motives, mislabeling products as small (as opposed to large) probably has a stronger effect on consumption than vice versa [28]. Nevertheless, more research evaluating the impact of labeling in setting smaller consumption norms seems worthwhile. However, since this labeling format seems less feasible based on the implementation process of the current study; we would also advice to give attention to the feasibility of implementing labeling in point-of-purchase settings. Perhaps formal legislation would be necessary in order to support the implementation of such a labeling format. For instance, a health code regulation was introduced in New York
City in 2008 requiring a number of fast-food chains to display food-item calories on menus and menu boards [29, 30].

All in all, the current study indicates that Portions per Container labeling is a labeling format that could help consumers to select healthier amounts of caloric snacks such as popcorn. More experimental research is necessary in order to collect additional support for the impact of labeling on consumer choices.
REFERENCES


16. Rolls BJ, Roe LS, Meengs JS. The effect of large portion sizes on energy intake is sustained for 11 days. *Obesity (Silver Spring)* 2007; 15: 1535-1543.


