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# The Effect of Single Serving Versus Entire Package Nutritional Information on Consumption Norms and Actual Consumption of a Snack Food

Beth Antonuk; Lauren G. Block, PhD

## ABSTRACT

**Objective:** Increasing serving sizes have been identified as contributors to the obesity epidemic. Researchers suggest that consumers are in need of cues that provide norms for the appropriate amount of food to consume. The impact of one potential cue, the provision of nutritional information for a single serving as well as the entire package ("dual-column labels") versus single-serving nutritional information only ("single-column labels"), was investigated on the consumption of a snack food for dieters and nondieters.

**Design:** In a between-subjects experimental design, participants were provided with a snack food product and nutrition label. After the opportunity for consumption, they were provided with a survey instrument.

**Setting:** The study took place in a classroom setting.

**Participants:** Undergraduate students were randomly assigned to the single-column versus dual-column label treatment groups and were classified as dieters ( $n=45$ ) or nondieters ( $n=67$ ) based on self-reported dieting behavior.

**Intervention:** Participants were exposed to either a single-column or dual-column nutrition label.

**Main Outcome Measures:** Perceptions of consumption norms; use, importance, and understanding of nutrition labels; and the actual amount consumed by each individual were measured.

**Analysis:** Analysis of variance was used to analyze data from the study.

**Results:** Nondietering participants, but not dietering participants, ate significantly less when exposed to the dual-column label compared to the single-column label ( $P<.05$ ). Although there was a significant difference in the amount consumed by dieters and nondieters in the case of the single-column label ( $P<.05$ ), the presence of a dual-column label attenuated this effect. In addition, dieters reported paying greater attention to ( $P<.01$ ), better perceived the necessity of ( $P<.01$ ), and had better understanding of ( $P<.05$ ) label information than nondieters. In addition, dieters considered the provided serving to be more adequate than nondieters ( $P<.05$ ).

**Implications for Research and Practice:** Compared to standard, single-column labels, dual-column nutritional labels have a greater impact on the snack food consumption of nondieters.

**Key Words:** dual-column label, nutrition label, serving size, portion size, consumption norm

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## INTRODUCTION

Over the past two decades, the United States has witnessed a dramatic increase in obesity rates. Results from the National Health and Nutrition Examination Survey estimate

that nationwide obesity grew from 11.6% of Americans in 1990 to 22.1% in 2002.<sup>1</sup> Interestingly, although consumers cut back on the consumption of fat during this time period, their consumption of total calories increased.<sup>2</sup> Nutrition professionals have attributed this somewhat paradoxical finding to the tendency for individuals to associate weight loss with the kind of food consumed, rather than the amount of food consumed.<sup>3,4</sup> Although limiting fatty foods contributes to a healthy lifestyle, weight maintenance is ultimately driven by the proportion of energy consumed (calories) to energy expended; therefore, exchanging a 3.5 ounce steak (which is the average serving recommended by

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the U.S. Department of Agriculture [USDA]) for a 2.9 cup serving of pasta (the median size of portions served by a sample of food retailers, according to Young and Nestle) actually tips the scale out of your favor in terms of calorie content.<sup>5,6</sup> Nutrition researchers point to “supersized” portions and the “more-is-better” marketing strategies of food retailers whose attempts to appeal to the value-conscious have resulted in a dramatic increase in average daily calories consumed, in addition to expectations regarding what constitutes an appropriate serving size.<sup>6</sup>

Although considerable attention has been paid to which foods are eaten (eg, fruit salad versus chocolate cake), there is much less research on the amount of food actually consumed (eg, one brownie versus four) despite the acknowledged impact of portion size on weight gain.<sup>6,7</sup> However, the few studies that do exist suggest that many environmental factors, including package size, variety, and the presence of others during consumption, have a significant effect on consumption volume.

For example, Wansink demonstrated that a larger package size stimulates product usage.<sup>9</sup> In fact, the impact of size is so pervasive that even less palatable foods are consumed in larger quantities when they are provided in larger packages. Wansink and Kim provided movie patrons with stale popcorn and found that individuals who were given large containers ate 33.6% more than those given medium-sized containers.<sup>10</sup> The positive relationship between portion size and amount consumed can be attributed to the cues provided by the package that contribute to larger consumption norms; in effect, a larger package containing multiple servings gives the individual the license and ability to consume more than a single serving.<sup>7</sup>

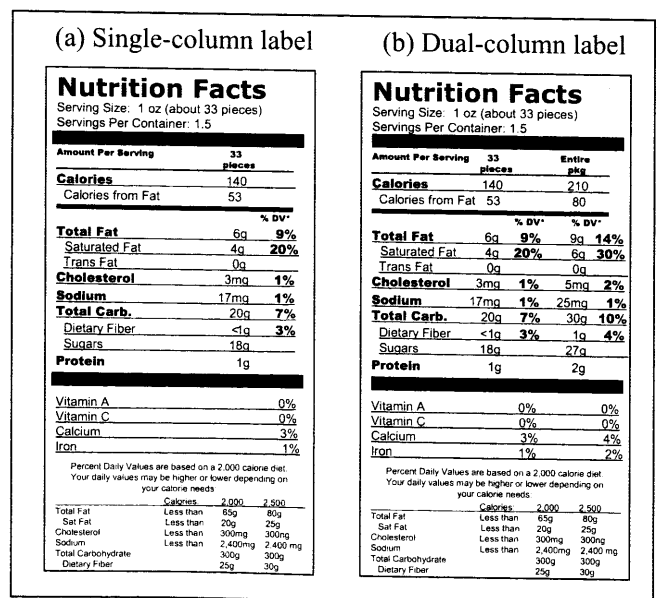
The importance of portion norms stems from the fact that the amount of food to consume is typically a low-involvement decision. Rather than consciously evaluating and monitoring appropriate serving sizes, individuals tend to rely on environmental cues to determine the appropriate amount to consume.<sup>7</sup> Over time, food manufacturers and retailers have increased the size of portions, contributing to larger consumption norms for consumers. Young and Nestle sampled a variety of foods from ready-to-eat food retailers, including take-out and fast-food restaurants, and compared the portions provided to recommended serving sizes from past years and current USDA and Food and Drug Administration (FDA) standard portions.<sup>6</sup> Their findings indicate that portion sizes began to increase in the 1970s and have continued to rise dramatically since that time. For example, study results show that items from the ready-to-eat cookie category exceed USDA portion sizes by 700% and bagels by 195%.

In addition, the objective increase in portion sizes has resulted in variations in consumers’ perceptions of what a standard or appropriate food portion should be. In other words, food retailers are setting the benchmark for what consumers view as appropriate portion sizes. A study by Young and Nestle asked college students to bring in a sample of a “medium”-sized food item, as qualitative terms

such as “medium” are used in federal definitions as well as by nutrition professionals in recommending portion sizes.<sup>8</sup> The bagels, baked potatoes, muffins, apples, and cookies provided were, in some instances, up to three times the size of that considered “medium” by the USDA. For example, the mean weight of the cookie sample (0.9 ounce) was nearly twice the size recommended by the Food Guide Pyramid (0.5 ounce), and only 3 of the 31 bagels (9.7%) fit the 2-ounce serving size guideline.

Facing an epidemic of “portion distortion,” or the tendency for consumers to eat the amount put in front of them rather than a recommended serving, researchers and policy makers suggest that consumers need assistance in deciding and monitoring how much they consume in a single sitting.<sup>7,10</sup> Some recommend describing portions in quantitative (eg, weight) rather than qualitative (eg, “medium”) terms as a means to reduce subjectivity in the determination of adequate serving sizes.<sup>8</sup> In addition, packaging might be changed to reduce the convenience of mindless eating; package designs that are more difficult to access or multipacks of individual servings might work to make consumption norms salient.<sup>11</sup> Likewise, simply increasing the number of servings per package might alter actual consumption.

Along these lines, consumer groups argue that current labeling practices, which allow multiple servings of a product to be sold in a single-serving container, mislead consumers by providing the nutritional information for only one serving.<sup>12,13</sup> In response, the FDA is considering additional labeling guidelines that would amend traditional “single-column labels” (see Figure, panel a). Recognizing that some relatively small food packages containing more than one serving might be eaten in their entirety by a



**Figure.** Single-column label listing nutritional information for one serving and dual-column label reflecting nutritional information for one serving, as well as that for the entire package.

consumer at one sitting, the proposed guidelines, which have already been adopted on a voluntary basis by several food manufacturers, would require packages to present the nutritional information for one serving as well as for the entire package.<sup>12</sup> These “dual-column labels” offer the nutritional information for the entire package as a separate, additional column on the Nutrition Facts panel (see Figure, panel b). Such labeling strategies might aid in consumers’ estimations of appropriate portion size, and therefore consumption norms, by making the recommended serving size more salient. To the best of the authors’ knowledge, no research to date has explored the effectiveness of these dual-column labels.

It is our belief that a dual-column label will serve as a contextual cue that makes the multiple servings within the single package salient to the consumer. In other words, the consumption norm is lower when individuals pay attention to the dual-column label. However, this effect may only be evident for consumers who are not actively restraining their eating behavior. Individuals with restrained consumption, such as dieters, are by definition trying to reduce the volume that they consume. For these individuals, portion size is less likely to be a low-involvement choice, but rather a conscious, effortful decision. Therefore, the dual-column versus single-column label may have less of an impact on reducing volume for dieters. Consequently, we explored whether the dual-column label, both in the presence and absence of dieting behavior, impacted consumption norms to result in changes in actual consumption.

## DESCRIPTION OF PARTICIPANTS AND PROCEDURE

A study employing a 2 (Label: Single vs. Dual) × 2 (Restrained Eating: Diet vs. No Diet) design was conducted to assess the impact of label and diet behavior on actual consumption of a snack food product. The study was approved by the Institutional Review Board for research involving human subjects at the institution where the data were collected. Study participants were undergraduate students from an introductory marketing course at a large northeastern university. The study was completed as part of a class exercise. Respondents with low scores in response to the question, “how much do you like this product?” were not included in the analysis, and data from 2 additional respondents were not considered as they indicated health problems (diabetes) that precluded them from consuming the product. Elimination of these data helped to ensure that the results are driven by the conditions of label and diet, rather than preference for the product or prohibitive health conditions. Thus, there were 112 usable responses (56% female; mean age 25.3 years).

All participants received a bag containing exactly fifty M&M’s candies. A separate nutrition label was provided in accordance with participants’ random assignment to the label condition (see Figure), which resulted in 54 respon-

dents receiving the single-column label and 58 respondents receiving the dual-column label. The labels used as stimuli were designed for the purposes of the experiment, and the Nutrition Facts panels used on Kraft Foods products were used as templates.<sup>14</sup> The serving size and nutritional information was based on that listed on an actual M&M’s label. The quantity of M&M’s recommended for a serving size varies by the total size of the packages (M&M’s are available in sizes ranging from 1.69 ounces to 52 ounces). Although a standard, single-serving bag of M&M’s (those typically found in point-of-purchase displays) suggests the entire 1.69 ounce package for a serving, larger, multiple serving bags recommend 1.5 ounces. Participants were provided with a total of 1.5 ounces of the product (or 50 candies), and the label stimuli stated that this amount is equivalent to 1.5 servings. Extrapolation down from this figure resulted in the recommendation for a single serving and associated nutrition information. A smaller single-serving size was chosen, as opposed to using a 1.5 ounce single serving and adjusting upward, because of the pervasive influence of contextual cues on consumption. As package size is shown to influence consumption volume, the authors did not want to encourage overeating by providing participants with a package containing an amount greater than that recommended for a single serving. In addition, doing so allowed for a more conservative test of the impact of dual-column labels, as it creates a consumption norm below that suggested by the actual food label.

To ensure that respondents attended to the accompanying nutrition label, they first completed an initial questionnaire that asked them to use the label to assess the amount of nutrients (eg, vitamin C, fiber, and calcium) and the number of servings contained in the package. In addition, participants responded using a 6-point scale to questions regarding how well they understood the information presented (1=“not at all” and 6=“very much”) and how often they pay attention to snack food labels (1=“almost never” and 6=“almost always”).

Following this task, participants viewed a short video. They were told that they could eat the M&M’s as a snack during the film if they wished. After the film concluded, a follow-up questionnaire was distributed that asked respondents to count the number of candies that remained in the bag. Actual consumption was calculated by subtracting this number from the fifty candies initially provided. Results from a pretest demonstrated a high level of correspondence between participants’ self-reported figures and researcher verified figures ( $r=0.99$ ,  $P<.01$ ).

In addition, participants provided responses on 6-point scales assessing liking for the product (1=“not at all” and 6=“very much”), the necessity of providing serving size information (1=“not at all necessary” and 6=“very necessary”), and the adequacy of the serving size provided (1=“inadequate” and 6=“adequate”). Dieting behavior was assessed based on agreement (yes vs. no) with the statement, “I am currently dieting or watching what I eat,” thus

resulting in 45 dieters and 67 nondieters. Finally, demographic information was solicited.

A 2 (Label: Single vs. Dual) x 2 (Restrained Eating: Diet vs. No Diet) ANOVA, with age and gender as covariates, was conducted to evaluate the interactive effect of diet and type of label on actual consumption. Because the self-reported dieting measure resulted in an inability to maintain equality between cells, all ANOVA and univariate tests were conducted using the GLM procedure with Type III sums of squares, which are invariant with respect to cell frequencies (*SPSS Base 11.5 User's Guide*. Chicago, IL: SPSS, Inc.; 2002.). All tests were conducted at a .05 significance level.

## FINDINGS

ANOVA results (see Table) show a significant interaction of label and diet ( $F_{1,110}=4.74, P<.05$ ) and a significant effect of age, such that older participants consumed more than younger ones ( $F_{1,110}=6.94, P<.05$ ). For nondieters, there was a significant difference between the amount consumed for those exposed to the single-column label (mean=33.03) and those exposed to the dual-column label (mean=20.81;  $F_{1,66}=5.78, P<.05$ ), such that the provision of the dual-column label reduced actual consumption. Among dieters, however, this impact was not observed; there was no significant difference in the amount consumed between those exposed to the single-column label (mean=21.63) and those exposed to the dual-column label (mean=25.52;  $F<1$ ). Moreover, results indicate that although dieters ate significantly less than nondieters when exposed to the single-column label, there was no significant difference between the amount consumed by dieters and nondieters who received the dual-column label (for single-column label: mean=21.63 vs. 33.03;  $F_{1,53}=5.60, P<.05$ ; for dual-column label: mean=20.81 vs. 25.52;  $F<1$ ). These results indicate that making the serving size more salient resulted in lower consumption for nondieters only. No other main effects (label, diet) or covariate effects (gender) were found.

Consistent with the theory that those on a diet have reduced consumption goals and norms, dieters rated the suggested serving size as more adequate (mean=4.22) than did nondieters (mean=3.69;  $F_{1,110}=4.31, P<.05$ ). In addition, dieters reported that they pay more attention to labels in general (mean=5.02 vs. 3.01;  $F_{1,110}=40.05, P<.01$ ) and found the nutrition label information easier to understand (mean=4.64 vs. 4.06;  $F_{1,110}=3.97, P<.05$ ) compared to nondieters. Dieters also placed significantly greater value on the presence of nutritional labels, indicating they consider them more necessary (mean=4.49) than nondieters do (mean=3.73;  $F_{1,110}=7.49, P<.01$ ). There were no significant differences between those exposed to the single-column and dual-column labels in terms of ability to understand the information presented. This finding provides evidence that it is the additional information provided in

the dual-column label that drives the results rather than confusion regarding the less familiar label format.

## DISCUSSION

These results indicated that a dual-column label reduces snack food consumption relative to a single-column label for people who were not currently dieting. Dieters' eating behavior, on the other hand, did not significantly vary based on type of label. Also, dieters were more likely than nondieters to perceive the recommended serving size of the snack food as an adequate amount to consume. In general, dieters paid more attention to nutrition labels, found them easier to understand, and believed they were more necessary to have than did nondieters.

These findings were consistent with the speculation that the dual-column label may act as a contextual cue to reduce the consumption norm. For nondieters, those who were less likely to pay attention to labels, it seems as though the provision of additional information related to serving size made the presence of multiple servings in the package salient. Rather than using the size of the package to infer the appropriate portion size, the amount recommended on the nutrition label served as a benchmark for consumption. This finding was particularly interesting because the single serving size suggested by the provided labels was approximately one-third less than that recommended by the actual M&M's product package. These findings supported the benefits of dual-column nutrition labels, but they also suggested that these positive effects may be limited to nondieters, or those whose portions might be more heavily influenced by contextual cues indicating appropriate portion size.

One interesting unanticipated result was that, when exposed to the dual-column label, the amount consumed by nondieters more closely matched the amount consumed by dieters. Only when nondieters were made aware of the number of servings did they monitor their eating behavior. This finding supported prior research suggesting that mindless eating lead to overeating, but it also indicated that actions could be taken to curb such behavior. For example, Wansink suggested ways of creating artificial stopping points for consumers, such as individually wrapped portions or markers placed inside or on the side of the package to indicate the amount contained in one serving.<sup>7,11</sup> This study provided evidence that dual-column labels acted as alternative cues to raise awareness about portion size to help minimize mindless overconsumption.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

Although preliminary evidence supporting the value of dual-column labels for nondieters is provided, it is also shown that these individuals were less likely to pay attention to label

**Table.** Comparison of Responses From Nondieters and Dieters Who Received a Candy Package Labeled in Either Single-Column (Single Serving) or Dual-Column (Single Serving and Entire Package) Format

	2 (Label: Single vs. Dual) × 2 (Restrained Eating: Diet vs. No Diet) ANOVA Results						Specific Contrasts				
	Means (Standard Deviations)			F values			F values				
	Nondieters		Dieters		Interaction of Label of Diet		Main Effect of Label		Main Effect of Diet		
	Single-column n = 30	Dual-column n = 37	Single-column n = 24	Dual-column n = 21	Overall	Label	Overall	Nondieters	Dieters	Single-column	Dual-column
Consumption†	33.03 (17.72)	20.81 (17.71)	21.63 (16.87)	25.52 (15.71)	4.74*	1.25	1.58	a vs. b	c vs. d	a vs. c	b vs. d
Adequacy of Serving Size‡	3.60 (1.30)	3.76 (1.36)	4.08 (1.38)	4.38 (1.20)	0.04	0.86	4.31*	5.78*	0.60	5.60*	0.14
Attention to labels§	2.80 (1.81)	3.19 (1.97)	4.96 (1.16)	5.10 (1.04)	0.47	1.01	40.05**				
Understanding of information	3.90 (1.52)	4.19 (1.61)	4.75 (1.07)	4.52 (1.25)	1.37	0.02	3.97*				
Necessity of labels¶	3.80 (1.50)	3.68 (1.40)	4.29 (1.37)	4.71 (1.42)	1.00	0.47	7.49**				

\*P<.05, \*\*P<.01.

†Number of pieces of candy consumed from a package of 50 pieces.

‡Means were measured on a 6-point scale (1=inadequate; 6=adequate).

§Means were measured on a 6-point scale (1=almost never; 6=almost always).

||Means were measured on a 6-point scale (1=not at all; 6=very much).

¶Means were measured on a 6-point scale (1=not at all necessary; 6=very necessary).

information than dieters. Because in the present study the effect of a dual-column label is tested, a mechanism is needed to ensure that respondents consciously attended to the label. However, in a typical consumption situation, a consumer may be distracted or disinterested, resulting in a lack of attention to label information and/or a reliance on alternate cues that imply larger portion sizes. Future research might explore the impact of dual-column labels in a more naturalistic setting and address manners in which interest and awareness among this subset of consumers could be generated.

In addition, future research might explore the impact of single-column versus dual-column labels among different types of food products. For instance, replicating these results with a snack product perceived to be moderately healthful, such as pretzels, would carry important implications, particularly for dieters. Although pretzels might be considered a more healthful alternative to candy, they can have a high caloric content if eaten in large quantities. In addition, although the authors focused on a snack food product, a dual-column label might also impact the consumption of a healthful item. Perhaps an increased consumption of healthful food would be seen rather than the decrease observed in the present study. For example, dieters might feel restricted in the number of candies that they should eat, but they are probably less likely to monitor their consumption of fresh vegetables. Future research that investigates the process by which serving size information is interpreted will aid nutrition researchers struggling to combat rising portion sizes and obesity.

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### CALL FOR GEMS and EDUCATIONAL MATERIALS RELATED TO THE NEW FOOD GUIDE PYRAMID AND 2005 DIETARY GUIDELINES FOR AMERICANS

Editors at the *Journal of Nutrition Education and Behavior (JNEB)* are actively seeking GEMs (Great Educational Materials). GEMs describe innovative programs and materials along with results from their initial evaluations. We are particularly interested in GEMs that illustrate how the 2005 Dietary Guidelines for Americans and/or MyPyramid are being used to train professionals or educate the public. GEMs should include evaluation information.

Authors and publishers of educational materials that have not been formally evaluated are encouraged to send items for review in JNEB. Guidelines for Writing GEMs and reviews of EDUCATIONAL MATERIALS are at [www.jneb.org](http://www.jneb.org); scroll down the page to locate pertinent links. Questions may be directed to Barbara Lohse, PhD, RD, Associate Editor, GEMs and Reviews, at [lohseb@psu.edu](mailto:lohseb@psu.edu).