



Is plain food packaging plain wrong? Plain packaging increases unhealthy snack intake among males



Carolina O.C. Werle^{a,*}, Laurie Balbo^b, Cindy Caldara^c, Olivier Corneille^d

^a Grenoble Ecole de Management, 12 rue Pierre Sémard BP 127, 38003 cedex 01 Grenoble, France

^b Montpellier Business School, Montpellier Research in Management, 2300 Avenue des Moulins, 34080 Montpellier, France

^c Université de Grenoble Alpes, CERAG UMR 5820, 150 rue de la chimie, 38040, Saint-Martin d'Hères, France

^d Université Catholique de Louvain, IPSY - Place Cardinal Mercier 10, bte L3.05.01 à 1348, Louvain-la-Neuve, Belgium

ARTICLE INFO

Article history:

Received 14 October 2015

Received in revised form 10 December 2015

Accepted 14 December 2015

Available online 17 December 2015

Keywords:

Plain packaging

Food consumption

Boomerang effect

ABSTRACT

Public policy makers have recently recommended deactivating the marketing functions of unhealthy food packaging by enforcing the use of plain food packaging. It is noteworthy, however, that no study to date examined the impact of plain packaging on consumers' perceptions and actual consumption of unhealthy food items. Three studies reported here addressed the latter questions. Study 1 shows that the plain packaging negatively impacts product and brand attitudes as well as intention to consume an unhealthy snack when consumers only evaluate the packaging. Study 2, however, reveals that when they taste the product, the plain packaging increases food consumption among males, while there is no difference for females. As a further insight, Study 2 shows that the plain packaging does not influence consumers' product and brand perceptions anymore following actual food consumption. Study 3 fully replicates Study 2 findings and additionally shows that the plain packaging and the low fat label packaging increase unhealthy snack intake to a similar extent in males and females, respectively.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

Food packaging is a critical component of marketing, which influences consumers' attention, expectations and purchase decisions about brands and products (e.g., Ares & Deliza, 2010; Becker, van Rompay, Schifferstein, & Galetzka, 2011; Labbe, Pineau, & Martin, 2013; Ng, Chaya, & Hort, 2013; Underwood & Klein, 2002). In the context of the obesity epidemic, public policy makers have recently recommended deactivating the marketing functions of packaging for unhealthy food by enforcing the use of plain packaging.¹ Of importance, however, evidence is currently lacking as to whether plain packaging effectively reduces intake for unhealthy food items. The present research set out to address the latter question. In this article, we briefly discuss the literature on packaging as well as on plain packaging in anti-smoking prevention. We then report and discuss three studies that investigated the

effects of plain packaging on consumers' perception and actual consumption of an unhealthy snack.

Over the past decades, food product packaging has become one of the most essential marketing tools. Besides its primary functions (protection of the content, transportation, storage and handling), packaging shapes consumer's perceptions and expectations about food products and provides food companies the last opportunity to persuade the consumers that their product should be purchased (Ares & Deliza, 2010). In stores, packaging shapes consumers' expectations about how a product would taste and decisions about whether it should be bought (Carrillo, Varela, & Fiszman, 2012). The influence of packaging is particularly powerful when purchase decisions are made impulsively or with low involvement (Liao, Corsi, Chrysochou, & Lockshin, 2015; Rebollar, Lidon, Martin, & Fernandez, 2012; Underwood, 2003).

At the time of buying, vision is the most operating sense (Labbe et al., 2013). In a snap, packaging must attract visual attention and convince potential buyers that the product is the best option (Rebollar et al., 2012). As a result, marketing research has devoted much attention to the role of visual packaging in guiding consumers' expectations and choices. Among the various dimensions of product packaging, color, shape and graphical elements received most attention from practitioners and researchers (e.g., Block, 1995; Celhay, Boysselle, & Cohen, 2015; Marshall, Stuart, & Bell,

* Corresponding author at: Marketing Department of Grenoble Ecole de Management, 12 rue Pierre Sémard BP 127, 38003 cedex 01, France.

E-mail addresses: carolina.werle@grenoble-em.com (C. O.C. Werle), l.balbo@montpellier-bs.com (L. Balbo), cindy.caldara@upmf-grenoble.fr (C. Caldara), olivier.corneille@uclouvain.be (O. Corneille).

¹ <http://www.bloomberg.com/news/articles/2015-01-23/junk-food-and-booze-could-follow-tobacco-in-plain-packaging-push>.

2006; Mueller & Szolnoki, 2010; Ng et al., 2013; Orth & Malkewitz, 2008; Raghubir & Greenleaf, 2006; Rebollar et al., 2012; Sester, Dacremont, Deroy, & Valentin, 2013).

To illustrate, Underwood, Klein, and Burke (2001) highlighted that the presence of images in the front of a packaging captures the attention of potential buyers. In the same sense, the perception of naturalness is affected by the presence of pictures representing a food item (Labbe et al., 2013). Packaging cues also enable consumers to make inferences about food and drinks taste (Becker et al., 2011; Huber & McCann, 1982; Pinson, 1986; Tuorila, Meiselman, Cardello, & Leshner, 1998) and texture (Ares & Deliza, 2010). For instance, Deliza and MacFie (2001) showed that the color of the packaging (white vs. orange) affects consumers' expectations of juice sweetness: compared to white, orange packaging led consumers to expect a higher level of juice sweetness which also affected taste evaluations. Few years later, Deliza, MacFie, and Hedderley (2005) indicated that the background color (orange vs. white) of a passion fruit juice pack also impacted consumers' evaluations of the juice: compared to the orange, when the juice is presented in the white packaging, consumers believed that it contained less sugar (sweetness), it was purer, fresher and more natural.

Research also shows that ill-conceived food packaging can have negative effects. Consumers exposed to a black package for a milk dessert associated it with the word "disgusting" (Ares & Deliza, 2010). In a recent article by Abrams, Evans, and Duff (2015), the front-of-package visual impacted parents' food product perceptions: the more colors and cartoon-like pictures on the front package, the less healthy the product was perceived to be. Recently, Elliott and Brierley (2012) reported a qualitative research that emphasized that colors and brand elements influence children's perceptions about the healthiness of cereals. Finally, there is evidence that children prefer food items wrapped in branded packaging over the same snacks wrapped in unmarked packaging (Robinson, Borzekowski, Matheson, & Kraemer, 2007).

The above literature indicates that packaging influences perceptions and expectations about food items among both adults and children. Therefore, plain packaging is likely to influence the way consumers appraise food products. Research on anti-smoking prevention additionally suggests that the use of a plain packaging (i.e., a packaging devoid of brand slogan, logo or color) decreases the appreciation of cigarettes and cravings (Gallopel-Morvan, Béguinot, Eker, Martinet, & Hammond, 2011; Gallopel-Morvan, Orvain, Waelli, & Rey Pino, 2012; Gallopel-Morvan et al., 2012; Hastings, Gallopel-Morvan, & Rey, 2008; Hogarth, Maynard, & Munafò, 2015). In a declarative survey, a representative sample of 836 French adults compared a plain pack and a traditional cigarette packet. The plain pack was considered by the respondents as more "dull, trite and ugly" than the traditional package, it did not attract respondents' attention and the majority of the respondents reported being unwilling to buy the cigarettes in the plain pack (Gallopel-Morvan et al., 2011).

In December 2012, Australia adopted plain packaging as an anti-smoking public policy strategy. The initial prevention outcomes of cigarettes plain packaging in Australia look promising (Zacher et al., 2014). Considering that worldwide obesity has more than doubled since 1980 and that, in 2014, more than 1.9 billion adults were overweight,² public policy makers in Australia and in the United Kingdom have recently recommended to adopt a similar policy for the packaging of unhealthy food items.³ In 2012, Mars Inc.

(the candy manufacturer) wrote a letter to the U.K. Department of Health to express the dramatic consequences that the tobacco plain packaging would have for food products. Recently, the U.K.-based Consumer Packaging Manufacturers Alliance, which represents brand owners and packaging companies, has expressed the same concerns regarding plain packaging for the food industry. It is currently unclear, however, whether plain food packaging effects survive actual food consumption in informed consumers and, more critically, whether plain food packaging reduces food intake.

Although a number of studies have questioned the responsibility of food marketing in the progression of obesity (for a review, see Chandon & Wansink, 2011), only a few examined the visual effects of packaging on food consumption over and above food perception (Deng & Srinivasan, 2013; Folkes & Matta, 2004; Madzharov & Block, 2010). And no published study to date specifically examined the impact of plain food packaging on food intake.

The present research aimed at filling this gap. Study 1 provides preliminary evidence on how plain food packaging influences consumers' perceptions about an unhealthy food item. Study 2 and 3 examine the impact of plain packaging on actual food consumption and whether effects of food packaging on food perceptions survive actual food consumption. The three studies were conducted with different groups of participants. Moreover, in all three studies, the effect of gender was also examined.

2. Study 1: prior to consumption, food plain packaging results in less positive attitudes and decreases purchase intention

Study 1 was designed to examine the influence of a plain packaging on the evaluation and intention to consume an unhealthy food item. To do so, a laboratory experiment with a one-factor (original packaging vs. plain packaging) between-subjects design was conducted. The product used for the test was peanuts covered with milk chocolate (Peanut M&M's) presented in small size packages (45 g, corresponding to the product sold in the out-of-house catering area).

2.1. Methodology

2.1.1. Stimuli

In order to have a prototype in the two experimental conditions and avoid the potential effects due to the quality of the stimulus, we manufactured the two types of packaging (original and plain packaging). Plastic zip-lock bags (8 × 12.5 cm, conventional size of the Peanut M&M's packaging containing 45 g) were covered on both sides with printed labels. For the original packaging, we color photocopied a classic Peanut M&M's packaging and printed the front and back onto the tags. We erased information about the number of calories contained in the front of the original packaging to keep the two prototypes comparable and so avoid confounds. For the plain packaging, white labels on which we had inscribed a brief product description in Times New Roman font (size 12, color black) « M&M's – 45 g of milk chocolate covered peanuts » were used. Finally, the two prototypes were filled with 45 g of Peanut M&M's.

2.1.2. Participants and procedure

One hundred and sixty-six business school students participated in this study ($M_{age} = 20.34$ years old; 66.5% females; $M_{BMI} = 21.05$) in exchange for course credit. Upon their arrival at the laboratory, participants were randomly assigned to one of the two experimental conditions and placed in front of computers, isolated from the other participants, to execute a packaging test. They received the original packaging or the plain packaging as well as

² The report is available at <http://www.who.int/mediacentre/factsheets/fs311/en/>.

³ The reader interested with this point could read those internet articles that report this point: <https://www.newscientist.com/article/mg22530120-200-if-tobacco-gets-plain-packets-will-junk-food-be-next/>. <http://www.bloomberg.com/news/articles/2015-01-23/junk-food-and-booze-could-follow-tobacco-in-plain-packaging-push>. <http://valdamarkdirect.com/plain-packaging-in-australia/>.

instructions to evaluate the packaging (without opening the pack and without tasting the product). The evaluation was made through an online questionnaire. Participants first indicated their consumption intention (“I have the intention to consume the product” from 1 = “strongly disagree” to 7 = “strongly agree”) and were asked to estimate the calories contained in the packaging of the product with an open-ended question. They then answered questions about their attitude toward the brand and toward the product using three semantic-differential items for each construct: good–bad, pleasant–unpleasant, and like–dislike measured in 7-point scales (adapted from Bergkvist & Rossiter, 2007). The obtained Cronbach's alpha for the attitude toward the brand and toward the product were .96 and .93 respectively. We then asked all participants to indicate the extent to which they agreed or disagreed (1 = “strongly disagree,” 7 = “strongly agree”) with the following seven statements: “The packaging attracted my attention”, “The packaging evokes the brand”, “The packaging is attractive”, “The packaging is appealing”, “The packaging is unpleasant” (reverse-coded), “I like the packaging very much”, “The packaging gives me a bad impression” (reverse-coded). We used these items because they exhibited a high degree of reliability in terms of coefficient alpha Cronbach's ($\alpha = .89$) and we averaged them to form a measure of attitude toward the packaging. Finally, participants reported their height and weight, which were used to calculate their body mass index (BMI).

2.1.3. Results

One-way between subjects ANOVAs were conducted to test the effect of packaging (original vs. plain) on consumption intention, calorie estimation, attitude toward the brand, attitude toward the product, and attitude toward the packaging. BMI was initially included as a covariate, but its inclusion did not affect the results for any of the dependent variables. Results are presented in Table 1. They show that participants exposed to the plain packaging had lower intentions to consume the product ($p < .001$), estimated that the product has fewer calories ($p < .05$), and had less positive attitudes toward the brand ($p < .001$), the product ($p < .001$), and the packaging ($p < .001$) than participants exposed to the original packaging.

We further explored the effect of gender on the dependent variables measured in this study. We ran separate two-way ANOVAs with type of packaging (original vs. plain) and gender (male vs. female) entered as the independent variables, and with consumption intention, estimation of number of calories, attitude toward the product, attitudes toward the brand and attitude toward the packaging entered as the dependent variables. Results indicated that neither the main effect of gender nor the interaction between gender and type of packaging were statistically significant for any of the dependent variables analyzed.

The results of Study 1 show that participants had less positive attitudes toward the product and the brand and were less willing to consume the product presented in the plain packaging in comparison to the product presented in the original packaging.

Interestingly, and somewhat ironically, when M&M's were wrapped in a plain packaging, participants estimated that they contained 100 fewer calories than those in the original, branded packaging (while the quantity was the same in both conditions).

In sum, confronted with a plain packaging, the consumer has a less favorable attitude toward the brand, the product, and the packaging. What we ignore yet is whether plain packaging affects actual snack intake. Study 2 was designed to investigate the latter question. Additionally, it allowed examining whether the impact of packaging on product and brand perceptions would survive actual food tasting experiences.

3. Study 2: the effect of food plain packaging on actual food consumption

Study 2 extends results obtained in Study 1 by implementing a snack intake measure.

3.1. Methodology

3.1.1. Stimuli

Stimuli were similar to those used in Study 1.

3.1.2. Participants and procedure

Seventy-seven business school students participated in this study ($M_{age} = 20.00$; $SD_{age} = 0.918$; 54.5% male) in exchange for course credit. The male and female participants were randomly assigned to the original and plain packaging conditions. Upon their arrival at the laboratory, participants were placed in front of computers, isolated from the other participants, and invited to execute a product test. They received the original packaging or the plain packaging and the instructions to taste the product. During the tasting test, we tried to reproduce an ecological context of sweets consumption. In order to achieve this, we used a now classic procedure, which consisted of asking participants to watch a neutral video of 3 min and 52 s (a documentary about an event hosted near the school) while tasting the product.

Once the video watching completed, the research assistant recuperated the packaging containing the leftovers and participants answered a short online questionnaire. The research assistant unobtrusively measured the quantity of product consumed while participants completed the questionnaire. As in Study 1, participants answered questions about their attitude toward the brand ($\alpha = .91$) and the product ($\alpha = .88$). As in Study 1, they also completed questions about their attitude toward the packaging ($\alpha = .91$). Finally, participants reported their height and weight, which were used to calculate their BMI. We also recorded time elapsed since their last meal to estimate their level of hunger at the moment of the study. Finally, we asked participants to estimate the number of calories contained on the amount of M&M's they consumed during the study.

Table 1
Study 1: influence of packaging on attitudes and intentions.

	Plain packaging		Original packaging		F-test	p-Value
	Mean	SD	Mean	SD		
Consumption intention	2.52	1.95	4.46	1.89	$F(1,165) = 42.276$	.001
Estimation of number of calories in the packaging	230.72	182.53	330.06	401.4	$F(1,158^a) = 4.026$	.047
Attitude towards the product	4.14	1.81	5.38	1.38	$F(1,165) = 25.019$	.001
Attitude towards the brand	4.93	1.76	5.88	1.14	$F(1,165) = 17.216$	.001
Attitude towards the packaging	2.39	1.01	4.57	1.35	$F(1,165) = 137.077$	.001

^a Calorie estimation was an open-ended question and not all participants estimated the calories of the product.

3.1.3. Results

One-way between subjects ANOVAs were conducted to test the effect of packaging on amount of M&M's consumed, attitude toward the brand, attitude toward the product, and attitude toward the packaging. BMI and time elapsed since the last meal was initially included as covariates, but their inclusion did not affect the results for any of the dependent variables. Results are presented in Table 2. They revealed that there were no differences overall in amount consumed across packaging conditions. As in Study 1, there was a significant difference across conditions for attitude toward the packaging ($p < .001$). Participants exposed to the plain packaging had a more negative attitude toward the packaging than those exposed to the original packaging condition. Of note, however, there were no differences on attitude toward the brand or toward the product among participants exposed to the plain or original packaging. There were also no differences across conditions on the estimated calories for the amount of M&M's consumed during the study.

As in Study 1, we then considered the role of gender. We ran a two-way ANOVA with the amount consumed entered as the dependent variable and the type of packaging (original vs. plain) and gender (male vs. female) entered as the independent variables. BMI and time elapsed since last meal were entered as covariates; however, only time elapsed since the last meal had a significant effect and was kept in the analysis, $F(1,76) = 3.573$, $p < .05$. Consistent with the prior analysis, results showed that the main effect of type of packaging on intake was not significant, $F(1,76) = 1.556$, $p = .216$. There was a main effect of gender on intake, $F(1,76) = 7.074$, $p = .010$: compared to females, males consumed significantly more M&M's ($M_{males} = 29.50$ and $M_{females} = 23.68$).

More importantly, the interaction between type of packaging and gender was significant ($F(1,76) = 4.685$, $p = .034$). Pairwise comparisons showed that males exposed to the plain packaging consumed significantly more M&M's ($M_{males\ plain} = 34.05$) than males exposed to the original pack ($M_{males\ original} = 26.08$; $F(1,41) = 4.947$, $p = .032$). There were no differences across conditions of packaging for females ($M_{females\ plain} = 23.29$; $M_{females\ original} = 24.05$; $F(1,35) = 0.577$, $p = .432$); see Fig. 1.

To test the effect of gender on the other dependent variables measured in this study, we ran separate two-way ANOVAs with type of packaging and gender entered as the independent variables and with attitude toward the product, attitudes toward the brand and attitude toward the packaging entered as the dependent variables. There were no significant interactions between gender and type of packaging for any of these dependent variables.

Study 2 shows that, following actual food consumption, only attitudes towards packaging remained influenced by the packaging format. Participants in the plain food packaging condition evaluated more negatively the packaging, but did not report anymore more negative attitudes toward either the brand or the product. More critically, Study 2 shows that male participants exposed to the plain packaging actually consumed more M&M's than those exposed to the original packaging. Snack intake in female participants remained unaffected by packaging. This unwarranted and unexpected of plain packaging among males may reflect Type 1 error. Therefore, Study 3 was run in order to examine the robustness of this effect. Although more secondarily, Study 3 also set out to compare plain packaging and low fat label effects, which adverse impact on indulgent food consumption has been evidenced (Wansink & Chandon, 2006).

Table 2

Study 2: influence of packaging on consumption and attitudes.

	Plain packaging		Original packaging		F-test	p-Value
	Mean	SD	Mean	SD		
Amount of M&M's consumed (in g)	28.83	12.39	25.21	11.37	$F(1,76) = 1.777$	.187
Estimation of the number of calories in the amount of M&M's consumed (kcal)	111.98	93.36	130.96	115.98	$F(1,76) = .462$	.499
Attitude towards the product	6.06	1.14	5.84	1.30	$F(1,76) = .859$	.357
Attitude towards the brand	5.83	1.08	5.69	1.04	$F(1,76) = .273$	.603
Attitude towards the packaging	3.31	1.41	4.58	1.45	$F(1,76) = 15.316$	.001

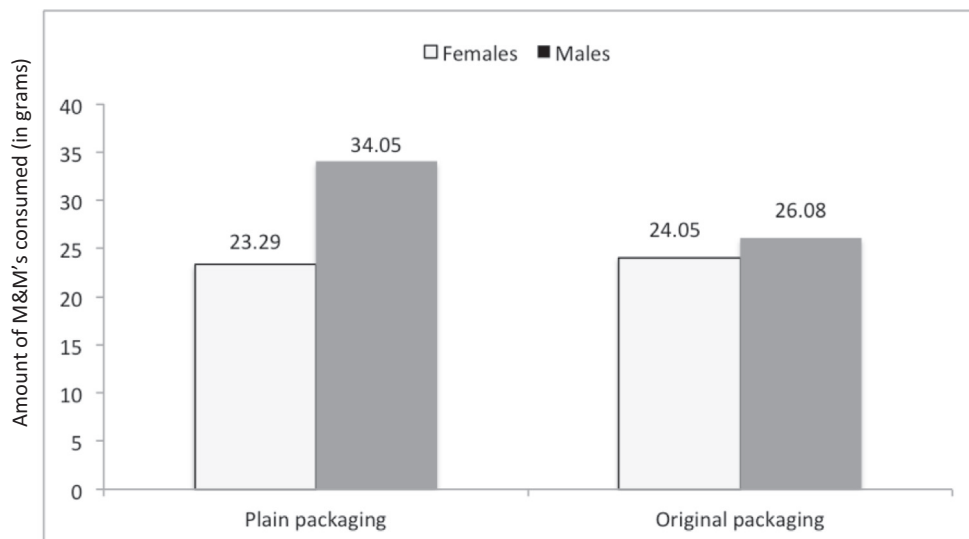


Fig. 1. Study 2: the effect of packaging and gender on amount of M&M's consumed.

4. Study 3: the effects of packaging (original, plain and light) on food consumption

4.1. Methodology

4.1.1. Stimuli

Stimuli were similar to those used Study 1 and 2. For the additional low fat label packaging, we added in the front of a classic peanut M&M's packaging tag a clear blue label showing "Low Fat".

4.1.2. Participants and procedure

Ninety-nine business school students participated in this study ($M_{age} = 20.65$; $SD_{age} = 1.35$; 55.6% females) in exchange for course credit. The male and female participants were randomly assigned to the original, plain, or low fat packaging condition. The procedure was similar to that used in Study 2 (attitudes toward the brand, $\alpha = .91$; the product, $\alpha = .88$; the packaging, $\alpha = .85$).

4.1.3. Results

A two-way ANOVA with amount consumed entered as the dependent variable and type of packaging (original vs. plain vs. low fat label packaging) and gender (male vs. female) entered as the independent variables was conducted. BMI and time elapsed since the last meal were entered as potential covariates; their inclusion did not affect the results. Results revealed a main effect of type of packaging on the amount consumed ($F(2,98) = 3.45$; $p = .036$; see Table 3). We ran a contrast test collapsing plain packaging and low fat label packaging (contrast coefficients:

plain = 0.5; low fat = 0.5; original = -1). Results indicated that participants in plain packaging and low fat label packaging ate more than participants in the original packaging condition ($t(96) = 2.140$, $p = .035$).

We also obtained a significant interaction between type of packaging and gender ($F(1,98) = 4.93$, $p = .009$). We further examined this interaction breaking down by gender. For females, the type of packaging had an effect on the amount consumed ($F(2,49) = 4.208$, $p = 0.021$). Results from planned contrasts revealed that there were no statistical differences on the quantity consumed between females in the original and plain packaging conditions ($p = 0.824$; $M_{females\ original} = 17.87$; $M_{females\ plain} = 18.61$) but we found significant difference between females who were in the original and low fat label packaging ($p = 0.014$). Females exposed to low fat label packaging ($M_{females\ low\ fat} = 28.13$) ate significantly more than females exposed to the original packaging ($M_{females\ original} = 17.87$). The difference between the plain packaging and the light packaging was also statistically significant for females: those exposed to the low fat label packaging ate significantly more ($M_{females\ low\ fat} = 28.13$) than those exposed to the plain packaging ($p = 0.013$; $M_{females\ plain} = 18.61$).

For males, packaging condition also had an effect on quantity of product consumed ($F(2,40) = 3.800$, $p = 0.031$). Results from planned contrasts revealed that there was no statistical difference on the quantity consumed between males who were in the original and low fat label packaging conditions ($p = 0.554$; $M_{males\ original} = 19.63$; $M_{males\ low\ fat} = 22.02$) but we replicated significant differences between males who were in the original and plain packaging conditions ($p = 0.011$; $M_{males\ original} = 19.63$; $M_{males\ plain} = 31.13$).

Table 3

Study 3: influence of original, low fat, and plain packaging on consumption and attitudes.

	Plain packaging		Original packaging		Low Fat packaging		F-test	p-Value
	Mean	SD	Mean	SD	Mean	SD		
Amount of M&M's consumed (in g)	22.88	12.48	18.34	11.37	24.53	11.21	$F(2,98) = 3.450$	.036
Estimation of the number of calories in the amount of M&M's consumed (kcal)	113.09	83.31	105.25	112.06	132.50	113.03	$F(2,90)^a = .569$	.568
Attitude towards the product	5.49	.93	5.67	1.12	5.59	1.37	$F(2,96)^b = .199$	.820
Attitude towards the brand	6.00	.75	5.90	1.16	5.70	1.01	$F(2,96)^b = .773$	.465
Attitude towards the packaging	3.48	1.49	4.53	1.11	4.75	1.22	$F(2,96)^b = 8.927$	.000

^a Calorie estimation was an open-ended question and not all participants estimated the calories of the product.

^b Two participants did not complete these measures when answering the questionnaire.

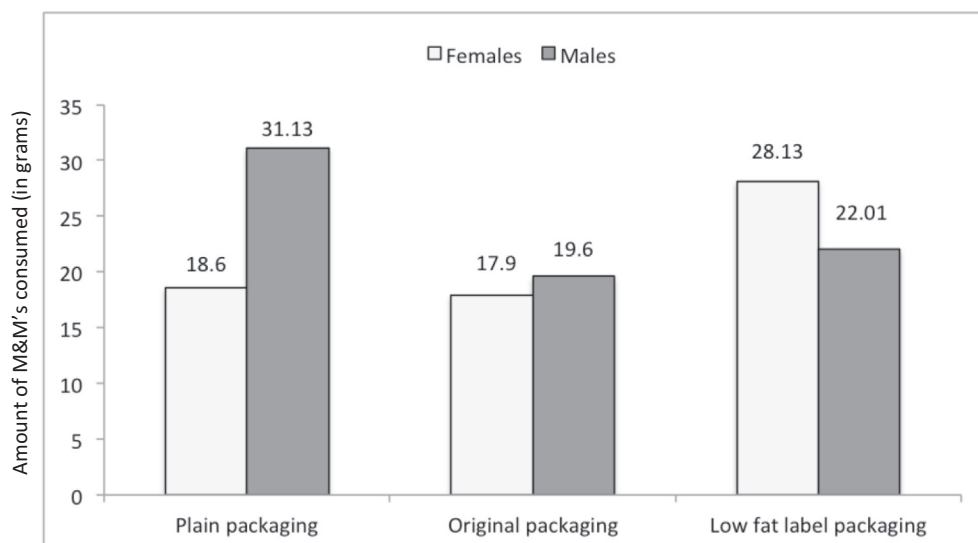


Fig. 2. Study 3: the effect of packaging and gender on amount of M&M's consumed.

and males who were in the low fat label and plain packaging conditions ($p = 0.041$; $M_{\text{males low fat}} = 22.02$; $M_{\text{males plain}} = 31.13$). Males exposed to the plain packaging ate significantly more M&M's than those exposed to the original or to the low fat label packaging.

In sum, plain packaging increased snack intake among males whereas low fat label increased snack intake in females (see Fig. 2).

One-way between subjects ANOVAs were conducted to compare the effect of packaging on attitude toward the brand, attitude toward the product, and attitude toward the packaging. BMI and time elapsed since the last meal were initially included as covariates, but their inclusion did not affect the results for any of the dependent variables. Results are presented in Table 3. In line with the results of Study 2, there were no differences in attitude toward the brand ($F(2,96) = .801$, $p = .452$) or toward the product ($F(2,96) = .097$, $p = .908$) across conditions. There were also no differences across conditions in the number of calories estimated for the amount of M&M's consumed ($F(2,90) = .404$, $p = .669$). Similarly to Studies 1 and 2, there was a statistically significant difference across conditions for attitude toward the packaging ($F(2,96) = 9.324$, $p < .001$).

Based on results of Study 2, we expected participants in the plain pack condition to have more negative attitudes towards the packaging than those in the low fat label and original packaging conditions. To test this hypothesis we ran a contrast test collapsing original pack and low fat label conditions (contrast coefficients: plain = -1 ; low fat = 0.5 ; original = 0.5). Results indicated that participants in the original and low fat label packaging conditions had more positive attitudes towards the packaging than participants in the plain packaging condition ($t(96) = 4.273$, $p < .001$).

Results from Study 3 fully replicate results obtained in Study 2 and therefore support the robustness of effects: (1) following actual food consumption, plain packaging influences attitudes about packaging, but does not influence anymore attitudes towards brand or product, and (2) plain packaging increases caloric intakes among males (but not females). Study 3 additionally shows (3) that low a fat label increases snack intake about females (but not males).

5. Discussion

5.1. The unwarranted effects of plain packaging

The present research examined how plain packaging affects attitudes and consumption for an unhealthy snack. We found in Study 1 that plain packaging for a sweet food item results in more negative attitudes toward the brand, the product, the packaging, and decreases purchase intention prior to product consumption. Following actual food consumption (Study 2 and 3), plain packaging did influence attitude toward the packaging, but did not influence attitudes towards the brand or the product anymore. Furthermore, and most critically, in Study 2 and 3, males actually ate more of an unhealthy snack displayed in a plain packaging format. Study 3 additionally shows that plain packaging increases consumption among males to the same extent as a low fat label increases consumption among females.

At first sight, the current results sharply differ from those obtained in the smoking prevention literature, with exposure to plain pack of cigarettes reducing product appreciation and desire to smoke (Gallopel-Morvan, Moodie et al., 2012; Gallopel-Morvan, Orvain et al., 2012; Hastings et al., 2008; Hogarth et al., 2015), and actual smoking overall (Zacher et al., 2014). What is effective for preventing smoking may not necessarily be as effective for reducing food consumption. Even worse, the present findings suggest that, although plain food packaging may adversely impact purchase intentions, it may actually increase actual food consumption once

the product bought or offered (at least among males). We deem it critical that future research advances our understanding of whether plain food packaging represents a viable health prevention strategy for fighting overweight and obesity. As mentioned in the introduction, there currently is a scarcity of research examining the impact of food packaging on actual food consumption, and the present study is the first to date that specifically examined the influence of plain food packaging on actual food consumption.

The present work contributes to the literature on how external cues influence food consumption (Chandon & Wansink, 2011; Wansink, 2007), by showing that a plain packaging only changes consumers' attitudes toward the product and the brand before consumption. When individuals have a chance to consume the product (i.e., for informed consumers), plain packaging has unwanted effects: snack intake increases among males and attitudes towards brand and product remain unchanged among males and females. One possibility for the boomerang effect on intake obtained here is that deactivating the marketing components of an unhealthy snack packaging deactivates the inhibition system associated with it (see Fishbach, Friedman, & Kruglanski, 2003). The current research, however, does not allow supporting or ruling out the latter possibility. And, in any case, it would have to explain why this process operates among males only.

Exposure to the original packaging displaying a low fat label increased snack intake among females in a similar manner than plain packaging increased snack intake among males. Again, future research should investigate the reasons why males and females reacted differently when exposed to a plain packaging versus a low fat label. What is clear however at this stage is that both product developments and prevention strategies initially aimed at reducing unhealthy snack intake may possibly lead to adverse effects. This is consistent with recent literature revealing increased consumption of unhealthy food items among consumers exposed to recommendations for eating more fruits and vegetables (Werle & Cuny, 2012).

5.2. Limitations of the research and future work

One limitation of the current study is that participants were presented with a single product, Peanut M&M's. Therefore, these findings cannot be generalized to other types of products. Future research is warranted to investigate the effects of plain packaging for different types of food, since previous research documented different effects of transparent packages on consumption according to food characteristics (Deng & Srinivasan, 2013).

Furthermore, this research was conducted only with Business School students. This convenient sample was used because it allowed the research to easily test the hypotheses without any confounds in the experimental design. As a consequence, caution is required in generalizing the results to the population of consumers in general.

In the three studies, we did not measure purchase intentions. However, in Study 1, we showed that when participants do not taste the product, those exposed to the plain packaging had lower intention to consume it than respondents exposed to the original packaging. These findings suggest that exposure to a plain packaging could reduce purchase intentions, which is the first way to decrease the consumption of unhealthy food. One should note, however, that providing plain food pack policy is actually implemented, consumers would have no choice but to actually be exposed to and so eventually consume plain pack snacks. Because we have seen that the evaluation of plain pack snacks is back to normal following their actual consumption, purchase intentions should eventually rise up accordingly, possibly to their current levels. This is perhaps particularly likely to happen considering the lower caloric estimates observed in Study 1 for plain pack products.

Another related and important issue is whether the effects of plain packaging on consumption and attitudes remain stable over time. Our studies investigated immediate effects of plain packaging. Over time, the consumers can reach a certain level of familiarity, habituation to the plain packaging. As Folkes and Matta (2004) showed, such habituation can lead to a diminution of the attention devoted to the snack container and in turn attenuate its effects on attitudes, consumption and thus purchase intentions. Having said this, it is also possible that consumers would eventually develop inhibitory goals that run counter to plain pack products (over) consumption in the longer run. The latter questions are certainly worth further empirical scrutiny.

Also, it is important to note that we were not able to measure the underlying mechanism responsible for the effects of plain the packaging. Using a free association task (FAT), a measure commonly used in psychology and sociology, would enable researchers to access to the mental representations of the consumers. Using a FAT to understand how different packaging (original, plain and low fat) creates different mental representations of the product seems to be a fruitful avenue for future research.

Finally, we did not inform participants in any of the studies of this research that the plain packaging could be used as an obesity prevention measure. We did so to preserve internal validity, because announcing that plain packaging is an obesity prevention measure would introduce a confound in the experimental design (since participants in the original packaging condition would not receive such information). It is however important to note that individuals' reaction to such a measure in the plain packaging condition may be different if they understand the objective of the type of packaging. Specifically, individuals may have high levels of reactance towards such a measure that interferes directly in the packaging of known products. Future research should investigate the effects of plain packaging on food consumption when the type of packaging is described as an obesity prevention strategy.

6. Conclusion

To our knowledge, this is the first research that explored the effects of plain food packaging on consumers' attitudes, purchase intention, and consumption. When consumers only evaluate the packaging of a food product, a plain packaging, in comparison to an original packaging, diminishes the consumers' attitudes towards the product, the brand, and the packaging, as well as consumption intention. Surprisingly, however, when consumers have a chance to eat the product, men actually consumed *more* food when they were exposed to a plain packaging in comparison to the original packaging. There were no differences across type of packaging for women. We replicated this undesired boomerang effect of food plain packaging among males and we also found that a plain packaging drives the same behavior for men than a low fat label packaging does for women.

Acknowledgement

This research was supported by a Grant of the Walloon Region in Belgium (FOOD4GUT, project # 1318148) and by a Grant from the Fondation Nationale pour l'Enseignement de la Gestion des Entreprises (FNEGE) which is located in France.

References

Abrams, K. M., Evans, C., & Duff, B. R. L. (2015). Ignorance is bliss. How parents of preschool children make sense of front-of-package visuals and claims on food. *Appetite*, 87(1), 20–29.

Ares, G., & Deliza, R. (2010). Studying the influence of package shape and colour on consumer expectations of milk desserts using word association and conjoint analysis. *Food Quality and Preference*, 21(6), 930–937.

Becker, L., van Rompay, T. J., Schifferstein, H. N., & Galetzka, M. (2011). Tough package, strong taste: The influence of packaging design on taste impressions and product evaluations. *Food Quality and Preference*, 22(1), 17–23.

Bergkvist, L., & Rossiter, J. R. (2007). The predictive validity of multiple item versus single item measures of the same constructs. *Journal of Marketing Research*, 44(2), 175–184.

Block, P. H. (1995). Seeking the ideal form: Product design and consumer response. *Journal of Marketing*, 59(2), 16–29.

Carrillo, E., Varela, P., & Fiszman, S. (2012). Packaging information as a modulator of consumer perception of enriched and reduced-calorie biscuits in tasting and non-tasting tests. *Food Quality and Preference*, 25(2), 105–115.

Celhay, F., Boysselle, J., & Cohen, J. (2015). Food packages and communication through typefaces design: The exoticism of exotypes. *Food Quality and Preference*, 39(1), 167–175.

Chandon, P., & Wansink, B. (2011). Is food marketing making us fat? a multi-disciplinary review. *Foundations and Trends in Marketing*, 5(3), 113–196.

Deliza, R., & MacFie, H. (2001). Product packaging and branding. In L. J. Frewer & E. Risvik (Eds.), *Food, people and society*. Springer, Germany: A European Perspective of Consumers' Food Choices.

Deliza, R., MacFie, H., & Hedderley, D. (2005). The consumer sensory perception of passion-fruit juice using free-choice profiling. *Journal of Sensory Studies*, 20(1), 17–27.

Deng, X., & Srinivasan, R. (2013). When do transparent packages increase (or decrease) food consumption? *Journal of Marketing*, 77(4), 104–117.

Elliott, C., & Brierley, M. (2012). Healthy Choice?: Exploring how children evaluate the healthfulness of packaged foods. *Canadian Journal of Public Health*, 103(6), 453–458.

Fishbach, A., Friedman, Ronald S., & Kruglanski, Arie W. (2003). Leading us not unto temptation: momentary al-lurements elicit overriding goal activation. *Journal of Personality and Social Psychology*, 84(2), 296–309.

Folkes, V., & Matta, S. (2004). The Effect of package shape on consumers' judgments of product volume: attention as a mental contaminant. *Journal of Consumer Research*, 31(2), 390–401.

Gallopel-Morvan, K., Béguinot, E., Eker, F., Martinet, Y., & Hammond, D. (2011). Perception de l'efficacité des paquets de cigarettes standardisés. Une étude dans un contexte français (Effectiveness perception of plain packaging of tobacco products: Findings from France). *Bulletin Epidémiologique Hebdomadaire*, 20–21, 244–247.

Gallopel-Morvan, K., Moodie, C., Hammond, D., Eker, F., Béguinot, E., & Martinet, Y. (2012). Consumer perceptions of cigarette pack design in France: A comparison of regular, limited edition and plain packaging. *Tobacco Control*, 21(5), 502–506.

Gallopel-Morvan, K., Orvain, J., Waelli, M., & Rey Pino, J. M. (2012). Demarketing tobacco products: the influence of plain packs on smokers and non-smokers perceptions and behavioural intentions. *Journal de Gestion et d'Économie Médicale*, 30(5), 322–331.

Hastings, G., Gallopel-Morvan, K., & Rey, J.-M. (2008). The plain truth about tobacco packaging. *Tobacco Control*, 17(6), 361–362.

Hogarth, L., Maynard, O., & Munafò, M. (2015). Plain cigarette packs do not exert Pavlovian to instrumental transfer of control over tobacco seeking. *Addiction*, 110(1), 174–182.

Huber, J., & McCann, J. (1982). The impact of inferential beliefs on product evaluations. *Journal of Marketing Research*, 19(3), 324–333.

Labbe, D., Pineau, N., & Martin, N. (2013). Food expected naturalness: Impact of visual, tactile and auditory packaging material properties and role of perceptual interactions. *Food Quality and Preference*, 27(2), 170–178.

Liao, L. X., Corsi, A. M., Chrysoschou, P., & Lockshin, L. (2015). Emotional responses towards food packaging: A joint application of self-report and physiological measures of emotion. *Food Quality and Preference*, 42(2), 48–55.

Madzharov, A. V., & Block, L. G. (2010). Effects of product unit image on consumption of snack foods. *Journal of Consumer Psychology*, 20(4), 398–409.

Marshall, D., Stuart, M., & Bell, R. (2006). Examining the relationship between product package colour and product selection in preschoolers. *Food Quality and Preference*, 17(7–8), 615–621.

Mueller, S., & Szolnoki, G. (2010). The relative influence of packaging, labelling, branding and sensory attributes on liking and purchase intent: Consumers differ in their responsiveness. *Food Quality and Preference*, 21(7), 774–783.

Ng, M., Chaya, C., & Hort, J. (2013). The influence of sensory and packaging cues on both liking and emotional, abstract and functional conceptualisations. *Food Quality and Preference*, 29(2), 146–156.

Orth, U. R., & Malkewitz, K. (2008). Holistic package design and consumer brand impressions. *Journal of Marketing*, 72(3), 64–81.

Pinson, C. (1986). An implicit product theory approach to consumer inferential judgments about product. *International Journal of Research in Marketing*, 3(1), 19–38.

Raghubir, P., & Greenleaf, E. A. (2006). Ratios in proportion: What should the shape of the Package be? *Journal of Marketing*, 70(1), 95–107.

Rebollar, R., Lidon, I., Martin, J., & Fernandez, M. J. (2012). Influence of chewing gum packaging design on consumer expectation and willingness to buy. An analysis of functional, sensory and experience attributes. *Food Quality and Preference*, 24(1), 162–170.

Robinson, T. N., Borzekowski, D. G., Matheson, D. M., & Kraemer, H. C. (2007). Effects of fast food branding on young children's taste preferences. *Archives of Pediatric and Adolescent Medicine*, 161(8), 792–797.

Sester, C., Dacremont, C., Deroy, O., & Valentin, D. (2013). Investigating consumer's representations of beer through a free association task: A comparison between packaging and blind conditions. *Food Quality and Preference*, 28(2), 475–483.

- Tuorila, H. M., Meiselman, H. L., Cardello, A. V., & Leshner, L. L. (1998). Effects of expectations and the definition of product category on the acceptance of unfamiliar food. *Food Quality and Preference*, 9(6), 421–430.
- Underwood, R. L. (2003). The communicative power of product packaging: creating brand identity via lived and mediated experience. *Journal of Marketing Theory and Practice*, 9(1), 62–76.
- Underwood, R. L., & Klein, N. M. (2002). Packaging as brand communication: effects of products pictures on consumer responses to the package and brand. *Journal of Marketing Theory and Practice*, 10(4), 58–68.
- Underwood, R. L., Klein, N. M., & Burke, R. B. (2001). Packaging communication: attentional effects of product imagery. *The Journal of Product and Brand Management*, 10(7), 1–19.
- Wansink, B. (2007). *Mindless eating: Why we eat more than we think*. New York: Bantam Dell.
- Wansink, B., & Chandon, P. (2006). Can “low-fat” nutrition labels lead to obesity? *Journal of Marketing Research*, 43(4), 605–617.
- Werle, C., & Cuny, C. (2012). The boomerang effect of mandatory sanitary messages to prevent obesity. *Marketing Letters*, 23(3), 883–891.
- Zacher, M., Bayly, M., Brennan, E., Dono, J., Miller, C., Durkin, S., ... Wakefield, M. (2014). Personal tobacco pack display before and after the introduction of plain packaging with larger pictorial health warnings in Australia: An observational study of outdoor café strips. *Addiction*, 109(4), 653–662.