





# Promoting Healthy Eating in Adults: An Evaluation of Pleasure-Oriented versus Health-Oriented Messages

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## ABSTRACT

**Background:** Existing initiatives to promote healthy eating remain largely ineffective as individuals struggle to adhere to dietary recommendations. Therefore, challenging the strategies currently used is of significant importance. Recent studies have indicated the potential of an approach oriented towards eating pleasure to promote the consumption of healthy foods.

**Objectives:** The aim of this study was to compare perceptions and the potential effect of pleasure-oriented and health-oriented messages promoting healthy eating among French-Canadians.

**Methods:** Two leaflets similar in all respects, except for the message orientation (pleasure or health), were developed. Perceived message orientation and effectiveness, perceptions towards healthy eating as well as emotions, attitude towards healthy eating, and intention to eat healthily were evaluated. A total of 100 adults (50% women; mean  $\pm$  SD age 45.1  $\pm$  13.0 y) were randomly assigned to read 1 of the 2 leaflets (pleasure:  $n = 50$ ; health:  $n = 50$ ). Questionnaires were completed online and data were also collected at a visit made to the Institute of Nutrition and Functional Foods.

**Results:** The difference in message orientation (pleasure compared with health) was well perceived by participants ( $P \leq 0.01$ ). The pleasure-oriented message was successful in inducing the perception that eating healthy can be pleasurable (pre- compared with post-reading;  $P = 0.01$ ). Perceived message effectiveness and induced emotions in response to reading were similar between leaflets. Both messages significantly improved global attitude towards healthy eating ( $P \leq 0.01$ ) and increased intention to eat healthily ( $P < 0.001$ ). Additional analyses showed that the affective attitude towards healthy eating increased more after reading the pleasure leaflet than the health leaflet ( $P = 0.05$ ), whereas the health message tended to improve cognitive attitude more than the pleasure leaflet ( $P = 0.06$ ).

**Conclusions:** These findings suggest that the leaflets would be appropriate to promote healthy eating through 2 distinct approaches (health and pleasure paradigms) and propose that different effects on attitude could be observed from these 2 approaches. *Curr Dev Nutr* 2019;3:nzz012.

## Introduction

Diet quality plays a vital role in promoting health and reducing prevalence of obesity and major chronic diseases (1, 2). To promote healthy dietary habits, public health authorities worldwide have launched various initiatives, all of which have in common the aim of promoting the consumption of nutritious foods through the transmission of information that focuses on the nutritional value of foods and their impact on health and body weight (3–5). Notwithstanding



**Keywords:** healthy eating, eating pleasure, message orientation, leaflet, healthy eating promotion, adults

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Manuscript received November 13, 2018. Initial review completed January 29, 2019. Revision accepted February 18, 2019. Published online February 19, 2019.

This work was supported by the Canadian Institutes of Health Research (grant FHG129921). The Canadian Institutes of Health Research had no role in the study design; in collection, analysis, and interpretation of data; in the writing of this article; and in the decision to submit it for publication.

Author disclosures: CV, AB, AB-G, VP, CB, SD, and SL, no conflicts of interest.

Supplemental Figures 1 and 2 are available from the "Supplementary data" link in the online posting of the article and from the same link in the online table of contents at <https://academic.oup.com/cdn/>.

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these tremendous efforts, adherence of the population to healthy eating recommendations remains suboptimal. In 2016, only 30% of the Canadian adult population reported eating fruits and vegetables  $\geq 5$  times/d, whereas the intake recommended by Canada's Food Guide is 7–8 servings/d (6). A study commissioned by the Heart & Stroke Foundation of Canada also revealed that, in 2015, 48.3% of caloric intake of Canadians aged  $\geq 2$  y was from ultraprocessed foods, including foods that do not belong to Canada's Food Guide (e.g., fast food, sugary drinks, snacks, chips, candies, cookies, sweetened cereals, sauces, and dressings) (7). A similar situation is observed in other industrialized countries, in which the consumption of a large proportion of the population does not meet dietary guidelines (8–11). These statistics suggest that most public health efforts based on the transmission of information to improve diet quality have had limited success (4, 12, 13). Therefore, new perspectives are needed to build effective healthy eating promotion strategies.

Increasing scientific evidence suggests that the use of positive strategies that recognize the importance of eating pleasure would be a promising approach to foster healthy dietary behaviors (4, 14–17). Pleasure-seeking is recognized to be a prominent factor in food consumption (18–21). This has been demonstrated in previous studies identifying taste as a major determinant of food choices (20, 22–24). Recent studies have also suggested that eating pleasure was associated with healthy eating behaviors such as the preference for smaller food portions and moderation (25). Additional research by Petit et al. (26, 27) has shown that strategies focusing on sensory aspects of healthy food increased the choice of these foods, especially in those with a high BMI, and may be more effective for people with unhealthy dietary habits. From a clinical practice perspective, a pilot randomized control trial has suggested that eating-related attitudes and behaviors could be improved through sensory-based interventions among restrained women (17). Collectively, these findings highlight the potential of a pleasure-oriented approach to foster healthy eating habits in individuals with suboptimal dietary habits.

Although a significant number of experts advocate that communication strategies emphasizing pleasure could influence more effectively individuals' eating habits compared with messages based on functional considerations of foods (e.g., health-based strategies) (4, 21, 26, 28, 29), the literature on this new perspective is still scarce. Moreover, substantial cultural differences in attitudes towards food and eating (e.g., pleasure- or health-oriented attitudes) exist (16, 30), limiting the possibility to generalize findings obtained from different countries (e.g., France, the United States). Hence, there is a need to examine the effects of a pleasure- compared with a health-oriented message strategy on adherence to healthy eating. However, an imperative first step is to assess whether the messages developed represent accurately these 2 distinct orientations in order to draw firm conclusions in future studies about the effects on eating-related variables of such perspectives.

Therefore, the objective of this study was to compare the perceptions, the potential effect, and the appreciation of pleasure-oriented and health-oriented messages aimed at promoting healthy eating in French-Canadian adults. We expected that individuals would be able to successfully recognize message orientation (pleasure compared with health). We also expected that pleasure-oriented messages would induce the perception that eating healthy can be pleasurable and would be associated with higher perceived message effectiveness, more intense

and positive emotions, higher affective attitude, and lower cognitive attitude compared with health-oriented messages.

## Methods

### Development of the leaflets

#### *Message orientation: dimensions of pleasure and health.*

In order to manipulate participants' perceptions towards healthy eating, 2 leaflets differing in message orientation have been developed: a "pleasure" version and a "health" version. In the pleasure leaflet, healthy eating was addressed through different dimensions of eating pleasure: 1) sharing a meal; 2) discovery and variety; 3) cooking; and 4) sensory aspects of foods. These dimensions were identified from previous focus groups led by our research team that assessed perceptions of healthy eating and eating pleasure in the study population (31). The health leaflet contained a message also promoting healthy eating and was intended to be similar to the traditional informational approach. Thus, the message focused mainly on the functional attributes of foods, such as nutritional quality and value of healthy foods, and their impact on general health and body weight. Healthy eating was promoted through 4 dimensions or health benefits also drawn from previous focus groups (31): 1) general health; 2) weight management; 3) energy; and 4) control of hunger and fullness cues.

#### *Message framing.*

Health communication research has shown that message framing plays an important role in the effectiveness of messages (32, 33). Indeed, messages might be more persuasive if framed according to the type of health behavior being targeted (34). To promote prevention behaviors (e.g., use of sunscreen, consumption of fruits and vegetables), a gain-framed message, which highlights the benefits of adopting a behavior, has been shown to be more persuasive than a loss-framed message (33, 35). Therefore, both versions of the leaflet featured advantages that could be gained by consuming a variety of high nutritional quality foods from either a health or a pleasure perspective.

#### *Message content.*

Healthy eating was promoted through all 4 food groups included in Canada's Food Guide (i.e. vegetables and fruits, grain products, milk and alternatives, meat and alternatives). Both versions of the leaflet contained  $\sim 500$  words, and included a title and a short introduction summarizing what it means "to eat well." In each version, the message was divided into 4 sections, each referring to 1 of the 4 food groups. Each section also referred to 1 dimension of eating pleasure or health, as described in [Table 1](#). Both versions were similar in all respects, except for the message orientation (pleasure or health) in order to ensure that any observed effect would be caused solely by the type of message (35–37). Therefore, length of the text, pictures representing food groups, foods, or meals proposed in the communications, as well as the design and the format of the leaflet were identical. The message content was reviewed by a panel of experts in the fields of communication, health promotion, and nutrition to assess the messages' credibility and to ensure that each dimension of eating pleasure and health was easy to identify and that the foods and meals proposed were representative of

**TABLE 1** Dimensions of pleasure and health used in the leaflets for each food group<sup>1</sup>

Food groups	Pleasure leaflet		Health leaflet	
	Dimension addressed	Section title	Dimension addressed	Section title
Vegetables and fruits	Cooking	Concoct doses of happiness	Weight management	Successful weight management
Grain products	Discovery and variety	Discover your new favourites	Energy level	Boost your energy level
Milk and alternatives	Sensory characteristics	Awaken your senses	General health	Staying healthy
Meat and alternatives	Sharing a meal	The pleasure of gathering together	Control of hunger/satiety signals	Lasting feeling of fullness

<sup>1</sup>The section titles were originally in French and were translated into English for the purpose of the present article.

each food group. Original leaflets are provided as supplemental data (**Supplemental Figure 1** and **Supplemental Figure 2**).

#### *Design of the leaflet.*

The leaflet was designed by a communication agency from Laval University, the Agence de communication Préambule, to offer a pleasing aesthetic and visual aspect. However, the design needed to be relatively neutral to enable the reader to direct his/her attention mainly on the message rather than on a design being overly appealing. Again, it ensured that no other variable aside from message orientation would generate an effect on the variables studied.

#### **Participants and procedure**

This study was conducted among adults aged between 18 and 65 y. Pregnant and nursing women, individuals with a special diet due to a health condition or eating disorders, and registered dietitians or students of nutrition were excluded from the study. Participants were recruited through the mailing lists of the Institute of Nutrition and Functional Foods and the institutional listserv of Laval University's staff and students. Each participant had to read only 1 version of the leaflet and was unaware of the other version. They were told that the aim of the study was simply to evaluate a new healthy eating promotion tool. Computerized randomization was generated by blocks of 20 participants and stratified by gender. This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the Laval University Research Ethics Committee. Written informed consent was obtained from all participants.

The study was conducted in 2 phases. First, participants completed 10 online questionnaires at home documenting, among others, sociodemographic data, food and eating perceptions as well as attitude towards healthy eating and intention to eat healthily; these questionnaires were hosted on a secure web platform (FANI, <http://inaf.fsaa.ulaval.ca/fani/>). Between 2 and 4 wk after the completion of these online questionnaires, participants were invited to the Clinical Investigation Unit of the Institute of Nutrition and Functional Foods to evaluate the new healthy eating promotion tool. Participants were met individually and were asked to read the leaflet. After the reading, they were immediately invited to complete online questionnaires onsite to assess their postreading perceptions, attitude, and intention as well as their reactions to the messages. The complete objective of the study was

then revealed and the second version of the leaflet was shown to the participant. Height and body weight were measured according to a standardized procedure (38) at the end of the visit, and a compensation of C\$50 was given to each participant.

#### **Measurements**

##### *Manipulation checks.*

After reading the leaflet, participants completed a manipulation check regarding the recognition of the message orientation (35, 39). Perceived message orientation was measured with the following 2 items on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree": "The message focuses on health benefits of eating healthily" and "The message focuses on the pleasure of eating healthily."

Overall message acceptance was assessed by items measuring the extent to which participants considered that the leaflets/messages were properly designed (35) and acceptable/relevant (39). Participants were asked the following 5 items on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree": "The message was: (i) clear; (ii) easy to understand; (iii) interesting; (iv) important; and (v) of a high quality." Each item was analyzed separately.

##### *Perceptions towards healthy eating.*

This measure aims to evaluate if the pleasure version of the leaflet induced the desired effect on the readers, namely perceiving that healthy eating can be enjoyable. Perceptions of healthy eating were measured by 2 items on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree," and were measured before and after reading the leaflet in order to assess change in participants' perceptions after having been exposed to the message. The items were: "According to me, eating healthily can bring me pleasure" and "According to me, eating healthily can help me achieve and maintain a good health." Differences in changes (post- compared with pre-reading of the leaflet) between both versions for these 2 items were also assessed.

##### *Perceived message effectiveness.*

Perceived message effectiveness may predict health behavior change as well as actual effectiveness of a health communication (40, 41). This variable was measured with eight 7-point semantic differential scales as proposed by Dillard and Ye (42) involving 2 dimensions: the global evaluation of message effect (persuasiveness of the message) and specific judgments of message attributes (believability of the message). The 4

impact items were: 1) persuasive/not persuasive; 2) effective/ineffective; 3) convincing/not convincing; and 4) compelling/not compelling. The 4 attribute items were: 1) reasonable/unreasonable; 2) logical/illogical; 3) rational/irrational; and 4) true to life/not true to life. Two distinct mean scores (impact and attribute scores) were calculated for each dimension.

#### **Induced emotions.**

Two main dimensions were used to document experienced emotions: arousal (calm–highly aroused) and valence (unhappiness–happiness) (43–45). Arousal was assessed with the use of the Self-Assessment Manikin method (44), which consists of a pictorial 9-point scale ranging from “totally calm” to “extremely aroused.” The reader was instructed to rate the level of stimulation felt while reading the message. A score from 1 to 9 was obtained for this variable. As for the valence, participants were asked to rate the following 6 pairs of bipolar adjectives (positively compared with negatively weighted adjectives) on a 7-point semantic differential scale ranging from “–3” to “3” (“0” being the neutral option): 1) unhappy/happy; 2) annoyed/pleased; 3) unsatisfied/satisfied; 4) melancholic/contented; 5) despairing/hopeful; and 6) bored/relaxed (44). A mean score was calculated for the valence of emotions induced by the messages.

#### **Attitude and intention.**

Attitude and intention from the theory of planned behavior, a useful framework for predicting and explaining people’s engagement in various health behaviors (46, 47), were assessed before and after reading the leaflet. Two components of attitude were measured: affective and cognitive attitude. Affective attitude towards healthy eating was assessed by the following 3 semantic differential scales: “Eating healthily in the next month would be ... (i) unenjoyable/enjoyable; (ii) unpleasant/pleasant; (iii) boring/exciting.” Cognitive attitude towards healthy eating was assessed by the following 3 semantic differential scales: “Eating healthily in the next month would be ... (i) not worthwhile/worthwhile; (ii) worthless/valuable; (iii) harmful/beneficial.” The score ranged from “1” to “7” (“4” being the neutral option) (48). Mean scores were calculated for both components of attitude and a global score was derived from all 6 items of attitude. Intention to eat healthily was assessed as the mean of the following 3 items on a 7-point Likert scale ranging from “strongly disagree” to “strongly agree”: 1) “I have the intention to eat healthily in the next month”; 2) “I will try to eat healthily in the next month”; and 3) “I’m motivated to eat healthily in the next month” (49–51). A change score (post- compared with pre-reading of the leaflet) was calculated for both dimensions of attitude and for intention to eat healthily.

#### **General appreciation.**

Participants were asked about their overall appreciation of the leaflet on a 10-point Likert scale ranging from “not at all appreciated” to “extremely appreciated.”

#### **Statistical analyses**

Data analysis was performed with SAS statistical software (SAS Studio version 3.6, SAS Institute Inc.). Statistical significance was set at  $P \leq 0.05$ . A Mann-Whitney-Wilcoxon  $U$  test was conducted to assess differences between both versions of the leaflet for individual Likert item and semantic differential scale as well as for mean scores not normally distributed. Repeated measurements (before and after reading

the leaflet) of ordinal data (perceptions of healthy eating, attitude, and intention) were analyzed with the Wilcoxon Signed-Rank test. Because these statistical tests are nonparametric, results are presented as median scores with 25th and 75th percentiles. Analyses were conducted to verify whether gender and BMI (BMI  $\leq 25$  kg/m<sup>2</sup> compared with BMI  $> 25$  kg/m<sup>2</sup>) moderate the effect of the health or pleasure condition on dependent variables with the use of the CATMOD procedure for ordinal variables and the GLM procedure for change scores (post- compared with pre-reading of the leaflet).

## **Results**

**Figure 1** shows the flow of participants through the study. Two hundred and four subjects were first assessed for eligibility, of whom 105 participants were randomly assigned to either the “pleasure” or the “health” condition. Five participants (4 randomized to the “pleasure” condition and 1 randomized to the “health” condition; 5% of the total sample) withdrew before the visit to our research institute during which subjects were asked to evaluate the leaflets. Therefore, 100 subjects evaluated the leaflets (50 assigned to the pleasure leaflet and 50 to the health leaflet).

#### **Characteristics of participants**

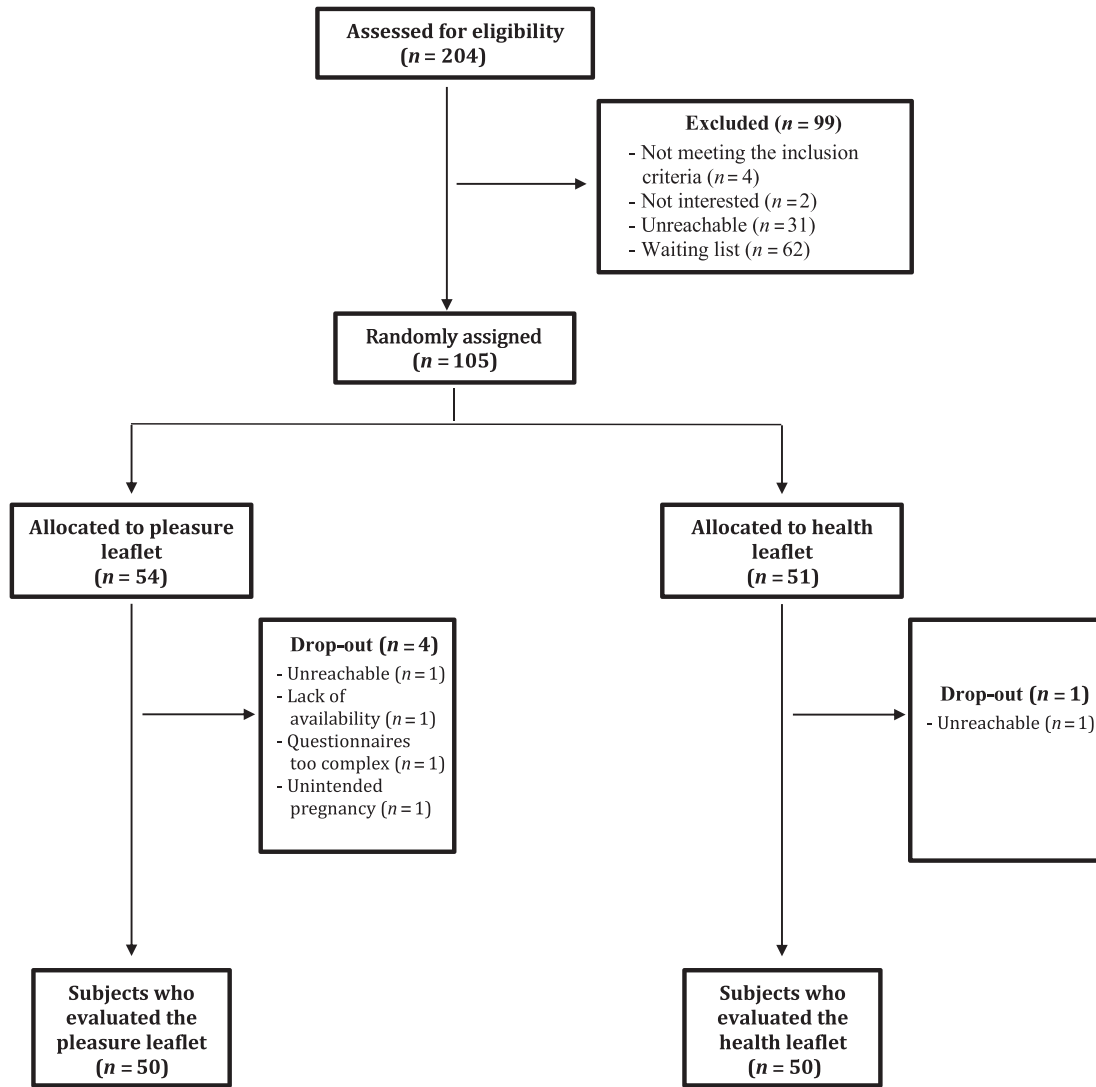
**Table 2** shows descriptive characteristics of participants in terms of gender, age, BMI, ethnicity, education, income, and employment status. In sum, participants included in the study had a mean age of  $45.1 \pm 13.0$  y, were overweight (mean BMI  $27.9 \pm 5.7$ ), were mainly Caucasians (95%), were mostly workers (66%), and the majority had a college or university degree (81%) and annual household income of  $\geq$  C\$50,000 (59%). Except for the mean BMI, which was significantly higher in the health condition than the pleasure condition, no differences were observed for baseline characteristics. Statistical adjustment for BMI (with the ANOVA procedure) did not change results obtained for dependent variables that significantly correlated with BMI (i.e., the item “The message was interesting” and the change in intention). For these variables, adjusted  $P$  values are presented.

#### **Manipulation checks**

Results regarding the manipulation check are presented in **Table 3**. The results showed that the orientation manipulation was successful because the pleasure version of the message was perceived as more focused on pleasure than the health version ( $P = 0.01$ ), whereas the health version was perceived as more focused on health than the pleasure version ( $P < 0.001$ ). Both versions of the leaflet showed similar acceptance, except for the clarity of the message, which was higher for the health-oriented message than for the pleasure-oriented message ( $P = 0.01$ ). For both leaflets, the messages were perceived as being moderately to strongly easy to understand, interesting, important, and of good quality.

#### **Perceptions of healthy eating**

**Table 4** shows that after having read the pleasure leaflet, a within-subject increase in the perception “Eating healthily can bring me pleasure” was observed ( $P = 0.01$ ). Such an increase was not observed after reading the health leaflet. The pleasure-oriented message also induced a significant increase in the perception that “Eating healthily



**FIGURE 1** Flow chart of the participants through the study.

can help me achieve and maintain a good health” ( $P = 0.002$ ), whereas this result was not observed after the reading of the health-oriented message. Changes for these 2 perceptions (“Eating healthily can bring me pleasure” and “Eating healthily can help me achieve and maintain a good health”) were not significantly different between both conditions.

#### Perceived message effectiveness

The median scores for the perceived message effectiveness are presented in Table 4. Results showed that both messages were perceived as being similar in terms of persuasiveness and believability.

#### Induced emotions

As shown in Table 4, the pleasure-oriented message did not induce more intense (arousal) and more positive (valence) emotions compared with the health-oriented message. The ratings of the arousal dimension of emotions were similar in both conditions. Regarding the valence of emotions, the median score was greater for the pleasure leaflet than

the health leaflet, although this difference did not reach statistical significance ( $P = 0.06$ ).

#### Attitude and intention

Table 4 presents the median scores before and after reading the leaflet for attitude and intention within each condition, as well as the differences in changes between leaflets. Regarding changes in the median scores within both conditions (post- compared with pre-reading scores), it was found that both leaflets improved global attitude towards healthy eating (pleasure:  $P = 0.001$ ; health:  $P = 0.01$ ). More specifically, the affective dimension of attitude increased after reading the pleasure-oriented message ( $P = 0.002$ ), whereas the cognitive attitude increased after reading the health-oriented message ( $P < 0.0001$ ). Comparison between both conditions revealed that the affective attitude towards healthy eating increased more in the pleasure condition than the health condition ( $P = 0.05$ ). A trend for a larger increase in cognitive attitude after reading the health-oriented message than after reading the pleasure-oriented message was also observed



**TABLE 2** Characteristics of participants ( $n = 100$ ) evaluating the healthy eating promotion leaflet containing either a pleasure- or a health-oriented message in a French-Canadian population<sup>1</sup>

Characteristic	Total ( $n = 100$ )	Pleasure leaflet ( $n = 50$ )	Health leaflet ( $n = 50$ )	Difference between pleasure vs health leaflet, $P$ value
Gender				
Male	50 (50)	25 (50)	25 (50)	—
Female	50 (50)	25 (50)	25 (50)	—
Age, y	45.1 ± 13.0	44.0 ± 12.6	46.3 ± 13.4	0.38
BMI, kg/m <sup>2</sup>	27.9 ± 5.7	25.0 ± 4.8	29.1 ± 6.3	0.03
Race/ethnicity				
Caucasian	95 (95)	47 (94)	48 (96)	1.00
African	3 (3)	2 (4)	1 (2)	—
Native American	1 (1)	0 (0)	1 (2)	—
Latino	1 (1)	1 (2)	0 (0)	—
Highest level of education completed				
High school	19 (19)	7 (14)	12 (24)	0.26
College	29 (29)	13 (26)	16 (32)	—
University	52 (52)	30 (60)	22 (44)	—
Household income, \$C				
0–19,999	12 (12)	3 (6)	9 (18)	0.35
20,000–49,999	25 (25)	15 (30)	10 (20)	—
50,000–99,999	38 (38)	18 (36)	20 (40)	—
≥100,000	21 (21)	12 (24)	9 (18)	—
Prefer not to answer	4 (4)	2 (4)	2 (4)	—
Primary employment status				
Student	7 (7)	3 (6)	4 (8)	0.07
Employed	66 (66)	39 (78)	27 (54)	—
Unemployed	2 (2)	0 (0)	2 (4)	—
Retired	22 (22)	8 (16)	14 (28)	—
Unable to work	2 (2)	0 (0)	2 (4)	—
Other	1 (1)	0 (0)	1 (2)	—

<sup>1</sup>Values are presented as  $n$  (%) or means ± SDs.

( $P = 0.06$ ). It was also found that the intention to eat healthily in the next month increased following the reading of both leaflets (both  $P < 0.001$ ).

### General appreciation

Both leaflets were similarly appreciated. Indeed, no difference was observed in median scores for general appreciation between leaflets.

### Subgroup analyses

No interaction between gender and condition (pleasure compared with health condition) was observed for any of the dependent variables. An interaction between BMI and the condition was noted only for the arousal score ( $P = 0.03$ ). Individuals with a BMI  $\leq 25$  felt more aroused when reading the pleasure-oriented message [median<sub>pleasure</sub> (25th percentile, 75th percentile): 7.0 (6.0, 7.0)] than when reading the

**TABLE 3** Differences in median scores for manipulation check variables between pleasure- and the health-oriented messages<sup>1</sup>

	Pleasure leaflet ( $n = 50$ ) Median ( $P_{25}$ , $P_{75}$ ) <sup>1</sup>	Health leaflet ( $n = 50$ ) Median ( $P_{25}$ , $P_{75}$ )	$P$ value <sup>2</sup>
Perceived message orientation: "The message focuses on ...			
... the pleasure of eating healthy"	7.0 (6.0, 7.0)	6.0 (5.0, 7.0)	0.01
... the health benefits of eating healthy"	5.5 (3.0, 7.0)	7.0 (7.0, 7.0)	<0.001
Message acceptance			
Clarity	7.0 (6.0, 7.0)	7.0 (6.0, 7.0)	0.01 <sup>3</sup>
Ease of understanding	7.0 (6.0, 7.0)	7.0 (7.0, 7.0)	0.10
Interesting	6.0 (6.0, 7.0)	7.0 (6.0, 7.0)	0.92 <sup>4</sup>
Importance	7.0 (6.0, 7.0)	7.0 (6.0, 7.0)	0.21
Good quality	7.0 (6.0, 7.0)	7.0 (6.0, 7.0)	0.92

<sup>1</sup>Scores ranged from 1 to 7.  $P_{25}$ , 25th percentile;  $P_{75}$ , 75th percentile.

<sup>2</sup> $P$  values for differences in change between both versions were obtained with the Mann-Whitney-Wilcoxon  $U$  test.

<sup>3</sup>The clarity score was significantly higher for the health version than for the pleasure version.

<sup>4</sup> $P$  value for BMI adjusted with an ANOVA procedure.

**TABLE 4** Median scores of variables assessing individual's perceptions and potential effect of pleasure- and health-oriented messages<sup>1</sup>

	Pleasure leaflet (n = 50) <sup>2</sup>			Health leaflet (n = 50)			
	Pre-reading Median (P <sub>25</sub> , P <sub>75</sub> )	Post-reading Median (P <sub>25</sub> , P <sub>75</sub> )	P value <sup>3</sup> (pre vs post)	Pre-reading Median (P <sub>25</sub> , P <sub>75</sub> )	Post-reading Median (P <sub>25</sub> , P <sub>75</sub> )	P value <sup>3</sup> (pre vs post)	P value <sup>4</sup> (pleasure vs. health)
Induced perception of healthy eating: "Eating healthy can ...							
... bring me pleasure"	6.00 (5.00, 7.00)	7.00 (6.00, 7.00)	0.01	6.00 (6.00, 7.00)	6.00 (6.00, 7.00)	0.80	0.11
... help me achieve and maintain good health"	7.00 (6.00, 7.00)	7.00 (7.00, 7.00)	0.002	7.00 (7.00, 7.00)	7.00 (7.00, 7.00)	0.13	0.28
Perceived message effectiveness							
Impact score <sup>5</sup> (persuasiveness)	—	6.00 (5.25, 6.00)	—	—	5.88 (5.25, 6.25)	—	0.68
Attribute score <sup>6</sup> (believability)	—	6.50 (6.00, 6.75)	—	—	6.75 (6.25, 7.00)	—	0.13
Induced emotions							
Arousal score (1–9)	—	6.00 (5.00, 7.00)	—	—	5.00 (3.00, 7.00)	—	0.16
Valence score (–3 to 3) <sup>7</sup>	—	1.92 (1.17, 2.33)	—	—	1.42 (0.17, 2.17)	—	0.06
Components of the theory of planned behavior							
Affective attitude	6.00 (5.33, 6.67)	6.67 (6.00, 7.00)	0.002	6.00 (5.67, 7.00)	6.00 (6.00, 7.00)	0.42	0.05
Instrumental attitude	6.67 (6.00, 7.00)	6.67 (6.33, 7.00)	0.11	6.33 (6.00, 7.00)	7.00 (6.33, 7.00)	<0.0001	0.06
Global attitude	6.33 (5.83, 6.83)	6.50 (6.00, 6.83)	0.001	6.17 (5.83, 6.67)	6.50 (6.00, 7.00)	0.01	0.90
Intention	6.00 (5.00, 7.00)	6.33 (6.00, 7.00)	<0.001	6.00 (5.00, 7.00)	6.67 (6.00, 7.00)	<0.001	0.99 <sup>8</sup>
General appreciation	—	7.00 (7.00, 9.00)	—	—	8.00 (7.00, 9.00)	—	0.77

<sup>1</sup>Except for arousal score (1–9), valence score (–3 to 3), and general appreciation (1–10), the score for the other items ranged from 1 to 7.

<sup>2</sup>n = 49 for affective, instrumental, and global attitude scores.

<sup>3</sup>P values for changes in score (post- compared with pre-reading of the leaflet) were obtained with the Wilcoxon Signed-Rank test.

<sup>4</sup>P values for differences in changes between both versions were obtained with the Mann-Whitney-Wilcoxon U test.

<sup>5</sup>The median score includes the items: not persuasive/persuasive, ineffective/effective, not convincing/convincing, and not compelling/compelling.

<sup>6</sup>The median score includes the items: illogical/logical, irrational/rational, not true to life/true to life, and unreasonable/reasonable.

<sup>7</sup>Median score for the mean of the 6 items.

<sup>8</sup>P value for BMI adjusted with an ANOVA procedure.

health-oriented message [median<sub>health</sub> (25th percentile, 75th percentile): 4.0 (3.0, 6.0),  $P = 0.01$ ]. No such difference was observed in individuals with a BMI >25 [median<sub>pleasure</sub> (25th percentile, 75th percentile): 5.0 (5.0, 7.0); median<sub>health</sub> (25th percentile, 75th percentile): 6.0 (4.0, 7.0),  $P = 0.81$ ].

## Discussion

The aim of this study was to examine the effects of 2 healthy eating promotion leaflets that differed in terms of message orientation, with 1 focusing on eating pleasure and the other focusing on health. Perceptions, the potential effect of messages, and their appreciation were evaluated. Overall, results suggest that the leaflets would be appropriate to promote healthy eating through 2 distinct perspectives (pleasure and health perspectives). Our results also propose that different effects on attitude could be observed from these 2 approaches.

As expected, results from the manipulation checks showed that orientation of both messages was correctly identified and that these messages were properly designed. These findings might be explained by the fact that dimensions of eating pleasure and health were derived from previous focus groups conducted among participants similar to our targeted population (31). Also, the language was carefully chosen to closely reflect the respective message orientation of each leaflet. In this way, the vocabulary used in the pleasure-oriented message referred mostly to sensations and emotions (e.g., creativity, having fun, deliciously, smooth), whereas wording selected for the health-oriented message referred to more rational considerations (e.g., control of appetite, dietary fibers, light, calories). Moreover, the reviewing of messages by a panel of experts and the editing of the leaflets by a communications agency have undoubtedly ensured the development of quality messages, corresponding to the intended pleasure and health focus. Although the pleasure-oriented message appeared to be less clear than the health-oriented message, the median scores of both leaflets for the item “clarity” corresponded nonetheless to the highest score on the scale. These high scores, as well as the relatively high general appreciation of leaflets (median score of 7 out of 10 for the pleasure-oriented leaflet and median score of 8 out of 10 for the health-oriented leaflet), indicate that clarity of the pleasure-oriented message is not an issue that will prevent these leaflets from being used in initiatives aimed at promoting healthy eating.

The results also showed that the pleasure-oriented message was successful in increasing the perception that healthy eating can be enjoyable among participants exposed to the pleasure-oriented leaflet. This is a promising result because this increase was observed although participants randomized into the pleasure condition showed strong eating enjoyment prior to the reading of the leaflet (median score before the reading was 6 out of 7). Moreover, it is noteworthy that this result was observed despite the fact that participants had a single and short exposure to the message. This finding suggests that the documented perception among the population that unhealthy foods are tasty and, conversely, that healthy foods are less tasty (known as the “unhealthy = tasty intuition”), is a malleable concept (16, 52, 53). Some authors have indeed suggested that judgments of healthiness and tastiness of foods vary across individuals, are susceptible to contextual influences, and are not fixed over time (52, 54). A recent study has

also shown that individuals evaluating foods mainly in a hedonistic perspective (a perspective similar to the concept of eating pleasure used in this study) and appreciating the sensory characteristics of food would be less likely to inversely associate tastiness and healthiness (55). Therefore, focusing on pleasurable aspects of eating when promoting healthy foods might be an effective approach to change perception about healthy eating. Regarding the perception that “Eating healthily can help me achieve and maintain a good health,” an increase has been observed among participants in the pleasure-oriented condition. Considering that the concepts of “good health” and “healthy eating” are often associated in public health communications as well as in popular media (14, 56), this result is not surprising. Moreover, there was no possibility for such an increase in the health condition because the score for this item was already at its maximum before reading the leaflet (median score was 7 out of 7).

Contrary to our expectations, the pleasure-oriented message was not perceived as being more effective than the health-oriented message. Indeed, both approaches appeared to be equally persuasive and believable. Because participants were already convinced about the health benefits of eating healthily prior to reading the leaflet, this might explain this observation. In fact, according to authors in the field of persuasive communication, if a message is of importance and relevant for the receiver, the persuasion will be more effective (57). Although our expectations were not met, it is worth mentioning that the median scores of the perceived effectiveness of the message in both conditions were high, meaning that pleasure- and health-oriented approaches both received high appraisal and, therefore, are both likely to foster changes in eating behaviors (58, 59).

Contrary to what was anticipated, although readers of the pleasure leaflet seemed to have experienced more appeal (arousal) and to have more pleasurable emotions (valence) than readers of the health leaflet, these 2 variables were not significantly different between both conditions. The method to diffuse the message chosen in this study might explain this observation. In fact, the written format and the length of the message require a certain level of concentration on the part of an individual. This cognitive task is therefore likely to restrain the emotional intensity and to influence the nature of emotions felt in comparison to more interactive channels of communication such as television advertising or a third party conveying the message (60). Because we showed that results relative to message orientation (pleasure or health) and the induced “pleasure effect” on perceptions are due to messages exclusively, modifications in the leaflet’s visual and design could now be made before its use in future studies in order to further affect the emotional response (61). As an example, instead of putting the same images in both leaflets, pictures representing as faithfully as possible each dimension of eating pleasure could be used in the pleasure leaflet, whereas pictures focusing on health attributes of foods usually associated with the promotion of healthy eating could be selected for the health leaflet. Because images are known to increase affective response to a message (61), we can hypothesize that performing such modifications in the leaflets’ visual and design could intensify the “pleasure effect” already conveyed by the message itself and lead to the expected greater induced emotion after reading the pleasure-oriented message compared with the health-oriented message.

Our results showed that each approach seems to target a different dimension of attitude (affective and cognitive) towards healthy eating,



and that changes in these components correspond to the orientation used. In fact, the pleasure-oriented message referring to emotional benefits has improved the affective component of attitude among participants, whereas the health-oriented message referring rather to cognitive outcomes and functional considerations of food improved the cognitive attitude among readers. This observation suggests that both messages have successfully transmitted their respective vision. Regarding differences in changes between leaflets, affective attitude towards healthy eating had increased more in the pleasure condition than in the health condition, whereas an opposite trend was observed for cognitive attitude. Some intervention studies assessing dietary behaviors such as fruit and vegetable intake have shown that affective messages were more effective than cognitive messages at favoring behavioral changes (48, 62–64). Taken together, these results suggest that efforts to promote healthy eating that target affective attitude such as a pleasure-oriented approach could be more powerful at fostering dietary behavior changes than efforts appealing solely to utilitarian considerations such as the health-oriented approach. However, additional intervention studies are needed to confirm this hypothesis.

Results showed that individuals with normal BMI were more stimulated by the pleasure-oriented message than by the health-oriented message, whereas both of messages induced the same level of stimulation in overweight participants. Because individuals with a high BMI more frequently associate negatively the notions of healthiness and tastiness than individuals with normal BMI (65), the association between eating pleasure and healthy foods characterizing the discourse in the pleasure leaflet might have first appeared flawed or pointless to overweight participants, which could explain why their level of stimulation towards this message was not significantly higher. Further studies are needed to better understand the influence of weight status on the response to an approach focusing on eating pleasure in the promotion of healthy eating.

In the context of this study, our definition of eating pleasure echoes the Epicurean pleasure as proposed by Cornil and Chandon (25) and defined as “the enduring pleasure derived from the aesthetic appreciation of the sensory and symbolic value of foods” (p. 52). Our definition of eating pleasure also includes the context in which the action of eating unfolds, namely the social factors (e.g., sharing a meal, cooking) and the physical environment (e.g., atmosphere, settings) (66, 67). Thus, it is essential that future studies conducted to replicate the present results in other populations also use this conceptualization of eating pleasure.

Some limitations of the present study should be mentioned. First, as in all nutrition studies that use self-reported questionnaires, we cannot exclude the possibility of results being influenced by a social desirability bias. Second, the participants in our sample had a great interest in nutrition, and therefore were not necessarily representative of the general population. However, some evidence suggests that individuals less interested in nutrition could also be appealed to via hedonic prevention messages. Petit et al. (27) have shown that individuals with unhealthy habits are more likely to be persuaded by positive and hedonic prevention messages. Therefore, strategies oriented towards eating pleasure are likely to reach other segments of the population but further investigation is needed. Third, although our sample was comparable to the population of Québec for household income [59% of subjects with household income of  $\geq$ C\$50,000 in our sample compared

with 59% in the province of Québec (68)] and for the percentage of Caucasians [95% in our sample compared with 87% in the province of Québec (68)] it was different for the BMI and the level of education. In fact, our sample was on the average more obese [31% compared with 23% in the general population (69)] and more educated [81% had a college or university degree compared with 48% in the general population (68)] than the population of Québec. These differences between our sample and the general population may have influenced in some ways the results obtained. In fact, education level has been shown to influence motives underlying food choices as well as behaviors related to food purchases (22, 70). For instance, health and weight concerns have a greater impact on food choices among Canadians with a college or university degree than among those with a lower level of education (24). Therefore, this predominance of highly educated individuals in our sample might at least partly explain why the health-oriented leaflet has induced high levels of arousal and positive emotions, therefore potentially limiting differences observed in comparison with the pleasure leaflet. In addition, individuals with an elevated BMI more frequently associate negatively the notions of healthiness and tastiness than do individuals with normal BMI (65), which may have reduced the impact of the pleasure-oriented messages in our sample. Taken together, these observations suggest that more significant differences in the impact of pleasure- and health-oriented messages could be observed in a more representative cohort. A fourth limitation is the difficulty of generalizing our results to other channels of communication to deliver the message (e.g., a third person or a video). For instance, it might be easier with interactive media to increase affective response of individuals to a message as well as its persuasiveness (60, 61). Nevertheless, our study has also important strengths, namely the notion of eating pleasure adopted in this study was not limited to the sensory aspects of foods but was multidimensional in nature. In addition, many attributes of the leaflets may explain why respondents reported high scores for message acceptance, perceived message effectiveness, induced emotions, attitude and intention towards healthy eating, and general appreciation, regardless of which version of the leaflet was evaluated. The fact that the leaflets' content was based on dimensions of eating pleasure and healthy eating corresponding to the perceptions of the targeted population, the gain-framed messages and the professional design of our leaflets are some of the attributes that can explain the high scores observed.

In conclusion, although an increasing number of experts advocate that communication strategies emphasizing pleasure could influence more effectively individuals' eating habits and behaviors compared with messages based on the health attributes of food (4, 21, 26, 28, 29), the literature about this new perspective is still scarce. In order to support research effort on the topic, the first contribution of our work was to develop and pretest new tools that represent accurately these 2 distinct orientations (pleasure and health), based on dimensions of eating pleasure and healthy eating corresponding to the perceptions of the targeted population. This study also represents an important first step in pursuing research efforts on the potential of a “pleasure” approach to promote healthy eating. In addition to producing new tools relevant for our population, this work also contributes to the expansion of the very limited literature comparing pleasure and health paradigms in the promotion of healthy eating, suggesting that pleasure-oriented messages would influence more effectively affective components of

attitude than health-oriented messages. Because previous studies have shown that affective messages were more effective than cognitive messages in favoring behavioral changes (48, 62–64), these results suggest that efforts in the promotion of healthy eating targeting affective attitude such as a pleasure-oriented approach could be more powerful for fostering dietary behavior changes than efforts appealing solely to utilitarian considerations such as the health-oriented approach. However, additional intervention studies are needed to confirm this hypothesis.

### Acknowledgments

This work was supported by the Canadian Institutes of Health Research (grant FHG129921). We thank Pénélope Daignault from the Department of Information and Communication of Laval University as well as Annie Lapointe, Louise Corneau, Audrey-Anne Dumas, and Myriam Landry from the School of Nutrition of Laval University for the revision of the leaflets' messages, as well as for their comments and suggestions. The authors' responsibilities were as follows—CV, AB, AB-G, VP, CB, SD, and SL: contributed to designing the study; CV and AB: were responsible for conducting the research, analyzing the data, and writing the article; CV, AB, and SL: had primary responsibility for the final content; and all authors: revised and approved the final manuscript.

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