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Message frame and self-efficacy influence the persuasiveness of nutrition information in a
fast-food restaurant

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Abstract

The present study investigated the persuasiveness of gain- and loss-framed information recommending healthier choices in fast-food restaurants. Visitors of two fast-food restaurants (N = 235) filled in a questionnaire concerning their fast food choices and received gain-or loss-framed nutrition information. The data revealed that gain- and loss-framed nutrition information were not differently persuasive, but that participants' self-efficacy to choose healthy products influenced the effect of framing. Specifically, for participants high in self-efficacy, the gain-framed message resulted in more positive attitudes towards healthy eating and stronger healthy eating intentions than the loss-framed message. However, for participants low in self-efficacy, the loss framed message resulted in stronger intentions than the gain-framed message. The study thus provides evidence for the role of self-efficacy as a potential moderator of the effects of framed nutrition information in a field setting.

Keywords: fast-food, point-of-purchase nutritional information, message framing

1. INTRODUCTION

The prevalence of nutrition-related disease and mortality has reached alarmingly high levels in Western countries (Lobstein, Rigby, & Leach, 2005). It is therefore necessary to develop effective behavioural interventions to change eating patterns in the population and improve diet quality. Reducing fast food consumption is one particularly pressing goal for health-promoters. With its low costs, large portions and high calorie density of signature menu items, consuming fast food makes it difficult not to exceed recommended dietary intake levels and has been found to increase people's risk of diabetes and heart disease (Odegaard, Koh, Yuan, Gross, & Pereira, 2012). In Belgium, where fast food consumption is high (Matthys, De Henauw, Bellemans, De Maeyer, & De Backer, 2006) and obesity prevalence rising (Stam-Moraga, Kolanowski, Dramaix, De Backer, & Kornitzer, 1999), there is a particular need for interventions that focus on fast food consumption.

Because environmental factors have been found to be important determinants of food consumption (Sobal & Wansink, 2007), the physical location where people buy and/or eat their food seems a good location to attempt to change food choices (Glanz & Yaroch, 2004). One particularly promising environmental health-promoting strategy consists of providing information on healthy choices at the point-of-purchase (Glanz & Yaroch, 2004). Indeed, the results of a study by Dumanovsky et al. (2011) suggest that adding calorie labels to menu items in fast food restaurants reduces the energy content of purchases. However, in another study, posting nutritional information in university canteens did not affect nutrient intake (Hoefkens, Lachat, Kolsteren, Van Camp, & Verbeke, 2011). The results of a third study yielded evidence for the effectiveness of providing nutrition information in full-service restaurants, but also suggested that any improvement in food choices may be concentrated in a very small subset of restaurant patrons (Pulos & Leng, 2010). It thus seems that offering nutritional information at the point-of-purchase does not always yield the intended results.

The present study investigated whether the effectiveness of providing point-of-purchase nutrition information can be increased by information framing. In addition, the present study investigated whether the persuasiveness of such information is influenced by recipients' self-efficacy.

Persuasive health information can be framed in terms of the benefits of engaging in healthy behaviour (gain frame), or in terms of the costs of engaging in unhealthy behaviour (loss frame). Likewise, point-of-purchase nutrition information can stress the healthy consequences of healthy menu options or the unhealthy consequences of unhealthy menu options. Empirical studies have shown that gain-and loss-framed messages can have different effects on individuals' motivation to perform healthy behaviours (Rothman & Salovey, 1997). However, studies also show inconsistent results with regard to which type of framing is more persuasive (for a meta-analysis see O'Keefe & Jensen, 2006). In the present study, it was investigated whether gain-framed or loss-framed point-of-purchase nutrition information is most persuasive. In addition, it was investigated whether the effects of gain- and loss-framed messages would be moderated by self-efficacy (Bandura, 1986), a major determinant of motivation to engage in healthy behaviour, including dietary behaviours (Linde et al., 2004). Rather than in a lab or at a university campus, the study was conducted in two fast-food restaurants in the vicinity of Brussels, Belgium, a country with a particularly high prevalence of obesity (Stam-Moraga et al., 1999).

2. METHOD

2.1 Procedure and Design

Customers lining up to order at the counter of the fast-food restaurants were approached by the experimenter and invited to participate after having finished their meal. Customers who agreed to participate were tested individually after having been seated at a quiet table with

their back to the restaurant and faced outside. The music boxes near this table were covered to minimize distraction caused by music in the restaurant. After being seated, participants were presented with a booklet containing 1) an informed consent form, 2) pre-treatment measures, 3) framed nutrition information and 4) post-treatment measures. As part of the pre-treatment measures, a list was presented defining the “healthier choices” in the fast-food restaurant. A product was considered “healthier” when it contained less than 250 kilocalories. A fish burger, although containing more than 250 kilocalories, was also considered “healthier” because regular consumption of fish has been found to be associated with a lower risk of cardiovascular disease (Oomen et al., 2000). After filling in the pre-treatment measures, participants were presented with gain- or loss-framed information about “healthier choices in a fast-food restaurant”. Next, participants filled in the post-treatment questionnaire, containing the dependent variables. Finally, participants were thanked and debriefed. As a reward for participation, participants were offered a beverage or a desert.

2.2 Pre-treatment measures: self-efficacy

A pre-treatment questionnaire assessed participants’ self-efficacy to choose the recommended healthier products. Two items measured how difficult or easy it would be to (1) choose a healthier product over a less healthy product *on one single occasion* and (2) *always* choose a healthier product over a less healthy product when eating in a fast-food restaurant (1 = *very hard*; 7 = *very easy*). Four additional items assessed whether participants thought they would succeed if they tried to choose healthier products over less healthy products when they 1) would be eating with people who choose less healthy products, 2) would be standing at the counter and would be confronted with smells and pictures of less healthy choices, 3) would be feeling sad, and when they 4) would be feeling happy (1 = *will certainly not succeed*; 7 = *will certainly succeed*). The six items were averaged to compose a self-efficacy scale ($\alpha = .89$).

2.3 Nutrition information

The nutrition information that was presented to participants consisted of gain- or loss-framed information about making healthier choices. The gain-framed information stressed the positive consequences of choosing the healthier products, whereas the loss-framed information stressed the negative consequences of not choosing the healthier products. The gain- and loss-framed information consisted of 127 and 134 words respectively and **are available in the Appendix.**

2.4 Post-treatment measures

2.4.1 Information acceptance. Eight items assessed information acceptance. Four items measured whether participants considered the information persuading, whether participants felt the information was addressed to them personally, whether the information was credible and whether the information should be used in future campaigns (1 = *surely disagree*; 7 = *surely agree*). Furthermore, four items measured **whether the information provided in the text was perceived as useful, interesting, objective and overblown** (1 = *surely disagree*; 7 = *surely agree*). The scores on the eight items were averaged to compose an information acceptance scale ($\alpha = .84$).

2.4.2 Attitude. Attitude was measured by eight items, assessing whether participants thought that choosing a healthier product over a less healthy product was important (1 = *very unimportant*; 7 = *very important*), good (1 = *very bad*; 7 = *very good*), positive (1 = *very negative*; 7 = *very positive*), reasonable (1 = *very unreasonable*; 7 = *very reasonable*), useful (1 = *very useless*; 7 = *very useful*), nice (1 = *not nice at all*; 7 = *very nice*), pleasant (1 = *very unpleasant*; 7 = *very pleasant*) and reassuring (1 = *not reassuring at all*; 7 = *very reassuring*). The eight items were averaged to compose an attitude scale ($\alpha = .91$).

2.4.3 Intention. Two items measured intention. One item asked participants whether they intended to choose healthier products over less healthy products more frequently when visiting fast-food restaurants (1 = *certainly not*; 7 = *certainly*). One item asked participants whether they intended to *always* choose healthier products over less healthy products when visiting fast-food restaurants (1 = *certainly not*; 7 = *certainly*). The two items were averaged into an intention scale ($\alpha = .82$).

2.4.4 Framing manipulation check. To check whether the manipulation of framing was successful, participants indicated the extent to which they felt the tone of the information was (1) *very negative* or (7) *very positive*.

2.4.5 Participants characteristics. The booklet ended by a short questionnaire assessing gender, age, highest completed education (1 = *elementary school*; 2 = *secondary education*; 3 = *higher vocational training or university education*), length and weight. The latter two questions served to calculate the BMI of each participant.

2.5 Statistical analyses

First, correlation analyses were performed to investigate the associations between variables. Second, randomization checks were performed to investigate whether participants in the gain- and loss-framed information conditions differed on any of the demographic variables. Also, manipulation checks were performed to investigate whether the manipulation of framing had been successful. Third, hierarchical linear regression analyses were performed with information acceptance, attitude and intention as the dependent variables. Information frame (-1 = loss, 1 = gain) and a centered self-efficacy score were entered as independent variables at step 1 and the interaction between frame and self-efficacy was added at step 2. In case of a significant interaction, this interaction was further analyzed by means of simple slope analyses. **In simple slope analyses, two equations are estimated: one depicting the relationship**

between the dependent variable (DV) and the independent variable (IV) at low levels of the Moderator (M) (usually 1 SD below the mean), and one depicting the relationship between the DV and the IV at high levels of the M (usually 1 SD above the mean). The advantage of simple slope analyses is that all data are used to estimate these ‘simple effects’, resulting in more power than a split-mean procedure (for more on simple slope analyses see Aiken & West, 1991). Semipartial correlations (sr) were reported as measures of effect size.

3. RESULTS

3.1 Participants

Participants were 235 customers of two fast-food restaurants (Restaurant 1: $n = 163$; Restaurant 2: $n = 72$) in the vicinity of Brussels, Belgium. Of all participants 55.3% were female; with a mean age of 33.70 years ($SD = 12.13$, range 18-67). Of all participants, 19% had a low education level, 31% had a middle education level, and 50% had a high education level. The study was approved by the ethical committee of the Faculty of Psychology and Neuroscience of Maastricht University which acts under the Helsinki agreement.

3.2 Correlations

Correlation analyses showed that intention was significantly correlated with age, self-efficacy, information acceptance and attitude. All correlations can be seen in Table 1.

3.3 Randomization check and manipulation check

Analyses were performed to investigate whether participants in the gain- and loss-framed information conditions differed on any of the demographic variables. Participants in the gain- and loss-framed information condition did not differ in gender, $\chi^2(1) 0.13, p = .72$, age, $t(232) = 0.53, p = .59, sr = .04$, BMI, $t(225) = 1.51, p = .13, sr = .10$, or level of education,

$\chi^2(2) = 1.74, p = .42$. There was also no difference in self-efficacy, $t(233) = 0.36, p = .72, sr = .02$, suggesting that randomization was successful. As evidence that the framing manipulation was successful, the results of an independent samples t-test showed that the gain-framed information was perceived as significantly more positive in tone ($M_{\text{gain-frame}} = 5.15, SD_{\text{gain-frame}} = 1.07$) than the loss-framed information ($M_{\text{loss-frame}} = 4.73, SD_{\text{loss-frame}} = 1.22$), $t(232) = 2.81, p < .05, sr = .18$.

3.4 Effects of framing and self-efficacy on the main outcome measures

3.4.1 Information acceptance. Step 1 of the regression analysis revealed a significant and positive effect of self-efficacy on information acceptance, $B = 0.15, t(232) = 3.34, p = .001, sr = .21$, while the effect of frame on information acceptance was not significant, $B = -0.06, t(232) = -1.06, p = .29, sr = -.07$. The results of step 2 showed that the interaction between frame and attitude did not contribute significantly to the prediction of information acceptance, $B = 0.06, t(231) = 1.24, p = .22, sr = .08$.

3.4.2 Attitude. Step 1 of the regression analysis revealed a significant and positive effect of self-efficacy on attitude, $B = 0.34, t(216) = 6.63, p < .001, sr = .41$, while the effect of frame was not significant, $B = 0.03, t(216) = 0.51, p = .61, sr = .03$. The results of step 2 showed that the interaction between frame and attitude contributed significantly to the model, $B = 0.10, t(215) = 1.98, p < .05, sr = .12$. Simple slope analyses revealed that when self-efficacy was high (1 SD above the mean), attitudes tended to be higher after having read gain- rather than loss-framed information, although this difference was only marginally significant, $B = 0.17, t(215) = 1.75, p = 0.08, sr = .11$. When self-efficacy was low (1 SD below the mean), the effect of frame was not significant, $B = -0.10, t(215) = -1.07, p = 0.29, sr = -.07$, indicating that both messages were equally persuasive for people low in self-efficacy (see Figure 1).

3.4.3 Intention. Step 1 of the regression analysis revealed a significant and positive effect of self-efficacy on intention, $B = 0.47$, $t(232) = 7.99$, $p < .001$, $sr = .47$. The effect of frame was not significant, $B = -0.21$, $t(232) = -2.70$, $p = .78$, $sr = -.02$. The results of step 2 showed that the interaction between frame and self-efficacy was significant, $B = 0.17$, $t(231) = 2.99$, $p < .05$, $sr = .17$. Simple slope analyses revealed that when self-efficacy was high (1 SD above the mean), the effect of frame was marginally significant, $B = 0.21$, $t(231) = 1.92$, $p = 0.06$, $sr = .11$, indicating that gain-framed information resulted in marginally stronger intentions to choose healthier products over less healthy products. When self-efficacy was low, loss-framed information resulted in significantly stronger intentions than gain-framed information, $B = -0.26$, $t(231) = -2.31$, $p = 0.02$, $sr = -.13$ (see Figure 2).

For all three outcome measures, the analyses were repeated with age, gender, education, BMI and study location as covariates. The results of these analyses yielded no changes in significance and led to identical conclusions.

4. DISCUSSION

The present study was the first to investigate whether information framing affects the persuasiveness of point-of-purchase nutrition information in fast-food restaurants. The results showed that neither information acceptance, nor attitudes towards choosing healthy products nor intentions to choose healthy products were differently affected by gain- versus loss-framed nutrition information. Rather, it was found that self-efficacy influenced the persuasiveness of framed nutrition information, such that gain-framed information was more persuasive for participants with high self-efficacy, whereas loss-framed information was more persuasive for participants with low self-efficacy.

For health-promoters and policymakers, this suggests that increasing self-efficacy at the point-of-purchase, in combination with gain-framed nutrition information, can be a

promising strategy to increase healthy food choices. It must be noted, however, that effective interventions to enhance self-efficacy will likely have a bigger effect than information framing, given the strong effects of self-efficacy on attitudes ($sr = .41$) and intention ($sr = .47$) and the relatively weak effects of information framing (the simple effects of framing under high- and low self-efficacy ranged from $sr = -.13$ to $sr = .11$). Indeed, meta-analytic studies have shown that information framing effects are generally not very strong (e.g., O’Keefe & Jensen, 2006; see also Van ’t Riet, Ruiters, Verrij, & De Vries, 2010). The results of the present study suggest that in a fast-food restaurant setting the effects may be particularly weak. Future research should investigate whether tips, prompts or information in other accessible formats can be used to increase self-efficacy at the point-of-purchase.

Why, then, was gain-framed information more persuasive among participants with high self-efficacy, whereas loss-framed information was more persuasive among participants with low self-efficacy? According to Rothman and Salovey (1997), gain-framed information is more persuasive when advocating behaviours that are perceived as relatively safe, because gain-framed information makes people risk-averse (Tversky & Kahneman, 1981) and thus more likely to engage in relatively safe health-behaviours. In contrast, they suggest that loss-framed information is more persuasive for behaviours that are perceived as relatively risky, because loss-framed information makes people willing to take risks (Tversky & Kahneman, 1981) and thus more likely to engage in risky health-behaviours.

It is possible that, in the present study, participants low in self-efficacy perceived a decision to start choosing healthy products over unhealthy products as entailing many uncertainties, primarily the risk that they would not be able to carry out their decision. This greater perceived risk may have been the reason that, for these participants, loss-framed information was more persuasive than gain-framed information. For participants with high self-efficacy, the preventive function of the recommended behaviour coupled with a high

probability that they would indeed be able to perform the recommendation may have made the recommended behaviour seem especially safe, hence the advantage of gain-framed information.

We did not assess directly whether self-efficacy affected perceptions of healthy food choices as relatively safe versus risky. However, one of the items that were used to assess participants' attitude towards choosing healthier products over less healthy products asked participants to indicate the extent to which they felt this behaviour was 'reassuring'. Additional analyses revealed that participants with high self-efficacy did indeed consider choosing healthy products over less healthy ones as more reassuring, $B = .33$, $t(217) = 5.25$, $p < .001$, $sr = .34$, than participants with low self-efficacy, which is what would be expected if high self-efficacy participants would regard this behaviour as relatively safe.

On the other hand, Rothman and Salovey (1997) also argue that people perceive behaviours that serve to prevent an illness as relatively safe, because they minimize the chance of falling ill, and that gain-framed information should thus be more persuasive when promoting relatively safe prevention behaviours. Since healthy eating clearly constitutes a health-prevention behaviour, this line of reasoning would predict a gain-framed advantage in the present study. The fact that no such advantage was found suggests that more research is needed to determine, the exact role of risk in framing effects.

While the results of the present study thus offer only partial evidence for Rothman and Salovey's (1997) account of message framing effects, they have more straightforward implications for another explanation of framing effects. This explanation holds that loss-framed information is generally perceived as more threatening than gain-framed information, and goes on to argue that threatening messages *can* be effective, but can also trigger a defensive 'boomerang' reaction (Van 't Riet, Ruiters, Smerecnik, & De Vries, 2010). Whether loss-framed information will result in persuasion or in defensiveness, in turn, is in large part

determined by how well-disposed people are to the recommended behaviour in the first place. Thus, a recent study found that loss-framed messages promoting skin self-examination (SSE) were more persuasive than gain-framed messages, but only among those recipients who already frequently engaged in SSE (Van 't Riet, Ruiters, & De Vries, 2012). Similarly, loss-framed information has been found to be more persuasive than gain-framed information for recipients who perceive the behaviour as relatively effortless (Gerend, Shepherd, & Monday, 2008).

If a similar process would have been at work in the present study, participants low in self-efficacy should have reacted defensively to the information and a loss-framed advantage would have only materialized in participants with a high self-efficacy. In fact, however, precisely the opposite pattern was found, suggesting that this explanation of framing effects does not provide an adequate picture. One caveat, however, is that the information used in the present study may not have been sufficiently threatening to trigger defensive processing. The analyses of our manipulation check showed that loss-framed information was perceived as more negative (less positive) in tone than gain-framed information, but this effect was small to medium in size ($sr = .18$). Moreover, both the gain- and loss-framed information were perceived as relatively positive in tone ($M_{\text{gain-frame}} = 5.15$; $M_{\text{loss-frame}} = 4.73$ on a scale ranging from 1 = *very negative* to 7 = *very positive*). Future research should investigate whether different interactive effects of self-efficacy and message framing can be found with the use of more threatening information.

In sum, our findings suggest that the effectiveness of point-of-purchase nutrition information in fast food restaurants is jointly affected by information framing and recipients' self-efficacy. The present study was the first to investigate whether information framing affects the persuasiveness of point-of-purchase nutrition information in fast-food restaurants. The major theoretical contribution of the present paper lies in the fact that the results are more

in line with theorizing grounded in Prospect Theory than with alternative theoretical frameworks that have been espoused in the message framing literature. More generally, they underline the importance of self-efficacy in persuasion, suggesting that self-efficacy, besides being a major determinant of motivation to engage in healthy behaviour, can also influence the differential persuasive effects of gain- and loss-framed nutrition information.

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Table 1 Means, standard deviations (SD) and correlations between Age, BMI, self-efficacy, framing manipulation check, information acceptance, attitude and intention

	M	SD	1	2	3	4	5	6
1. Age	33.70	12.13						
2. BMI	23.65	4.00	.38**					
3. Self-efficacy	4.58	1.33	.12	-.06				
4. Framing manipulation check	4.94	1.17	.15*	.05	.22**			
5. Information acceptance	4.77	.95	.24**	.04	.21**	.55**		
6. Attitude	5.05	1.09	.24**	.07	.41**	.36**	.48**	
7. Intention	3.59	1.35	.20**	.00	.46**	.23**	.41**	.60**

* $p < .05$

** $p < .01$

Figure 1 Attitude towards choosing healthy products over unhealthy products as a function of self-efficacy and information framing

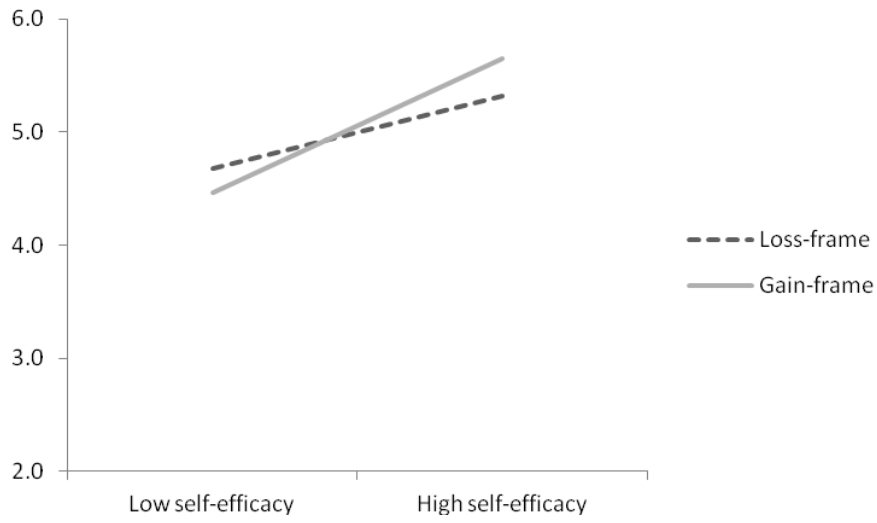
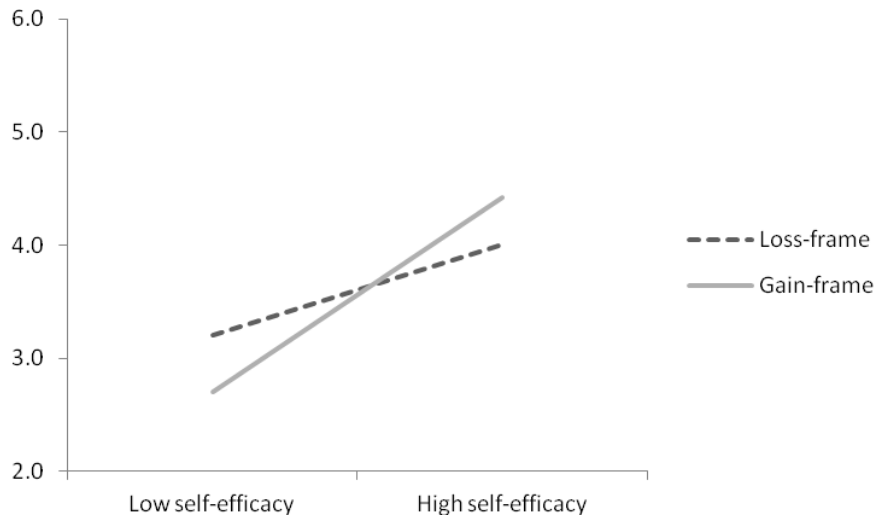


Figure 2 Intention to choose healthy products over unhealthy products as a function of self-efficacy and information framing



Appendix: The Gain- and Loss-Framed Messages

Gain-Framed Message

Healthy food contributes to a healthy body. By choosing low-fat products, you will be able to stay fit and prevent weight loss.

A healthy weight¹ makes you feel fit and energized. Moreover, feeling healthy can make you feel more positive about yourself. Also, a healthy weight reduces the risk of certain diseases, like cardiovascular diseases and cancer.

The healthier products at [NAME FAST-FOOD CHAIN] contain markedly less fat than less healthy products. By choosing healthier products over less healthy products you can maintain a healthy weight, with all the positive consequences that this brings.

In short, if you make a healthy choice when visiting [NAME FAST-FOOD CHAIN], you can work on a healthy weight.

¹ With a healthy weight we mean having a BMI in the range 19-25. You can calculate your BMI by dividing your weight by the square of your height. Thus, someone who weighs 70 kilos and is 1.75 meter tall has a BMI of $(70 / (1.75 * 1.75)) = 23$.

Loss-Framed Message

Unhealthy food is bad for your health. By choosing high fat products, you won't be able to stay fit and prevent weight loss.

Not having a healthy weight makes you feel tired and lacking energy. Moreover, people who are overweight are oftentimes less satisfied with themselves¹. Also, an unhealthy weight is an important risk factor for certain diseases, like cardiovascular diseases and cancer.

The less healthy products at [NAME FAST-FOOD CHAIN] contain markedly more fat than the healthier products. By choosing less healthy products over healthier products, you run the risk of being overweight, with all the negative consequences that this brings.

In short, if you do not make a healthy choice when visiting [NAME FAST-FOOD CHAIN], you will miss a chance to work on a healthy weight.

¹ With a healthy weight we mean having a BMI in the range 19-25. You can calculate your BMI by dividing your weight by the square of your height. Thus, someone who weighs 70 kilos and is 1.75 meter tall has a BMI of $(70 / (1.75 * 1.75)) = 23$.