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# **Food compensatory intentions and giving in to food indulgence**

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## Abstract

Previous research has shown that food temptations influence formation of compensatory intentions. Moreover, past study demonstrated that mental representations of goals can be triggered by environmental cues without a consciously made choice such that the subsequent behaviour is then guided by these goals. The present study verified the effect of food temptations on formation of compensatory behaviour intentions. The research also determined the effect of exercise priming on formation of compensatory intentions.

A total of 120 female students were randomly assigned to the experiment four conditions; 1) no food exposure and neutral environment (n=26) 2) no food exposure and exercise-primed environment (n=31) 3) food exposure and neutral environment (n=34) 4) food exposure and exercise-primed environment (n=29). The food consisted of chocolate muffins, pastry puffs and apple cookies. Exercise primes used were home trainer and exercise promotion poster.

Food exposure and exercise priming did not influenced formation of compensatory behaviour intentions. The study demonstrated that exposure to high-calorie foods and exercise priming elicits behavioural intentions to consume fast food like hamburger, pizza and fries. People exposed to high-calorie pastries expressed higher intentions to eat fast food. Likewise, people manipulated with exercise primes expressed higher intentions to eat fast food. Furthermore, exercise priming made people dissatisfied of their own weight. These findings may contribute to environmental cues that activate a desire to eat a specific type of food. The study also adds to the literature that exposure to slim body images leads to people's dissatisfaction of their own weight. Messages in the environment thus affect people's subsequent behavioural intentions and current self-concept.

**Keywords:** compensatory health behaviour; behavioural intentions; food exposure; temptation; exercise priming; indulgence

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## CHAPTER

# 1 Introduction

During the last decades, the prevalence of overweight and obesity (extreme overweight<sup>1</sup>) in societies worldwide has increased dramatically, particularly among children [1]. While there are 1.6 billion overweight adults worldwide, among them 400 million are obese [2]. Obesity is prevalent in America and Europe, although there is also an increasing number of people with obesity in the Middle East, Asia Pacific and even Sub-Sahara Africa [3]. The global phenomenon of overweight and obesity has substantial implications for health. It is associated with an increased risk on chronic diseases, hypertension, stroke, type 2 diabetes, osteoarthritis, respiratory problems, sleep apnoea, breast, prostate and colon cancers, social exclusion and depression [4]. According to the National Obesity Observatory (Department of Health, United Kingdom) [5], key causes of overweight and obesity include excessive food consumption and lack of physical activity. Essentially, the combination of insufficient physical activity and enlarged energy intake (for example from high calorie foods) may lead to more body fat and in this way to overweight and obesity.

Aside from diet and physical activity the environment has been found to influence obesity [6]. It has been argued that overeating is also caused by a persuasive ‘toxic’ food environment, in which cheap, good-tasting, high calorie food is easily available [7]. At the same time, our environment does not promote exercise and physical activity. For example, the United States’ food environment facilitates unhealthy food choices because of an excess supply of snack foods, sweetened beverages, fast food, and super-sized, easily accessible foods that are high in sugar, fat, sodium, and calories [8]. The toxic food environment is also known as the ‘obesogenic’ environment [9, 10].

The ability of individuals to have control over their impulses to eat more than what is good is for them is of increasing importance in this current “toxic food environment”. Self-control over impulses is necessary when temptations are present in one’s environment [11]. It requires overcoming the impulses in an effortful, deliberate and consciously initiated process [11]. Being able to control yourself and resist temptation is a key factor towards maintaining a healthy weight [12]. However, this is not an easy task. A person with the long-term goal of maintaining a certain body weight or losing weight may experience internal conflicting feelings or dissonance when confronted with indulgent food temptations. This uneasy state comes from the choice an individual has to make between long-term goal of weight control versus enjoying the present moment of indulgence (for example by eating a delicious yet high-calorie cake) [13]. People nowadays are often faced with the challenge of resisting food temptations.

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<sup>1</sup> Overweight is typically defined as having a body mass index  $>25 \text{ kg/m}^2$ , obesity starts with a body mass index  $\geq 30 \text{ kg/m}^2$

To succeed in resisting tempting impulses, people employ a variety of self-control strategies [14]. For example, people can remove desired objects from their view (e.g. put cookies in a cookie jar), so that they are less tempted. Another way in which people try to manage temptations is formation of ‘compensatory intentions’. Compensatory beliefs are convictions that the negative consequences of engaging in an indulgent behaviour can be neutralized by the positive effects of another behaviour [15]. They allow individuals to give in to temptation, because they plan to perform a future compensatory behaviour, so their initial goal will not be compromised. For example, people can tell themselves ‘It is okay to eat this chocolate cake, because I am going to the gym tonight’. Thus, forming these intentions allow people to enjoy foods without thinking they have broken their diet or done something ‘wrong’. An individual giving in to indulgence alleviates their conflicting or even guilt feeling by forming compensatory intentions. This is usually in the form of exercise or engagement to physical activity, in order to burn the high caloric intake from food indulgence [16].

Forming compensatory intentions could be a useful strategy to achieve long term goals related to health, particularly when they are acted upon. In other words, if applied correctly (i.e. followed up) it allows people to be more flexible with the way they achieve their goals. For example, the Dutch Nutrition Centre is promoting a ‘balance day’ as a way to motivate people to compensate occasions of overeating within a short time span (‘Next day I will have a ‘balans dag’) [17]. However, if people do not follow up what they promised themselves, compensatory intentions may get in the way of healthy eating habits or a successful diet. Hence it has been argued that forming intentions to compensate an indulgence is not a good tool to control oneself. Experts disagree regarding the usefulness of compensatory mechanisms as a tool to control oneself as many factors (i.e. forgetting about them) can prevent people from actually performing the compensatory behaviour in mind.

## **1.1 Research questions**

In this thesis, the role of compensatory intentions in relation to food exposure and exercise priming were examined. Kronick and Knauper [15] showed that dieters have compensatory intentions and that having them leads people to give in to the temptation. The authors assessed dieters’ thoughts when presented with the choices between an attractive high calorie cookie and a less attractive low calorie cookie, a situation which can be expected to evoke conflicting thoughts. It may be, however, that people are not aware of their compensatory intentions or do not want to express them openly. In this study, participants had to indicate themselves (by means of filling in questionnaire) whether they had compensatory intentions or not when faced with appealing pastries. Participants being exposed to a food temptation may feel a need to compensate for giving in to the temptation. Therefore, in this thesis we first of all focus on research question 1:

- 1. Do people express higher intentions to be more physically active, eat less or change food habits when faced with a food temptation?*

Furthermore, we wonder what cues in the environment of people affect the formation of people’s good intentions such as being physically active, eating less or change in food habits. Research on

how people set and pursue their goals has shown that mental representations of goals can also be triggered by environmental cues without a consciously made choice such that subsequent behaviour is then guided by these goals [18, 19]. For example, studies have shown that observing someone engaging in an action or imagining action leads to an increased tendency to perform that behaviour oneself [20, 21]. Priming people with exercise related materials might trigger concepts related to eating or other supposed good behaviours. For example, previous research has also shown that exercise commercials or promotion posters impact people's food consumption [22]. It could be that sitting in a room full of objects and promotional materials relating to exercise (e.g. exercise promotion poster, home trainers) leads higher intentions to exercise, but also to eat more healthy and in smaller quantities:

2. *Does priming people with exercise increase their personal intentions to exercise, eat less and eat healthier?*

Examining the role of such beliefs in food consumption decisions might help to understand why people indulge. Given that overeating is a huge problem at a global scale, it is important to understand how compensatory intentions influence what people consume. If compensatory intentions lead to food indulgence, it implies that people who intend to be healthy should be aware of the negative influence of these behavioural intentions. Hence, findings from this research could be of help in avoiding justifications from compensatory intentions or motivate in accomplishing the good behavioural intentions.

# 2 Theoretical Framework

## 2.1. Compensatory Health Beliefs Model

Rabiau and colleagues propose the Compensatory Health Beliefs model [13]. This model builds on the self-control literature (i.e. the balance between fulfilling your immediate desires and adhering to long-term goals). The model tries to explain why people form compensatory intentions to self-regulate resisting temptations. Key concepts in the model include the motivational conflict between desire and goal, compensatory health beliefs, compensatory behaviour intentions and implementation (see Figure 1).

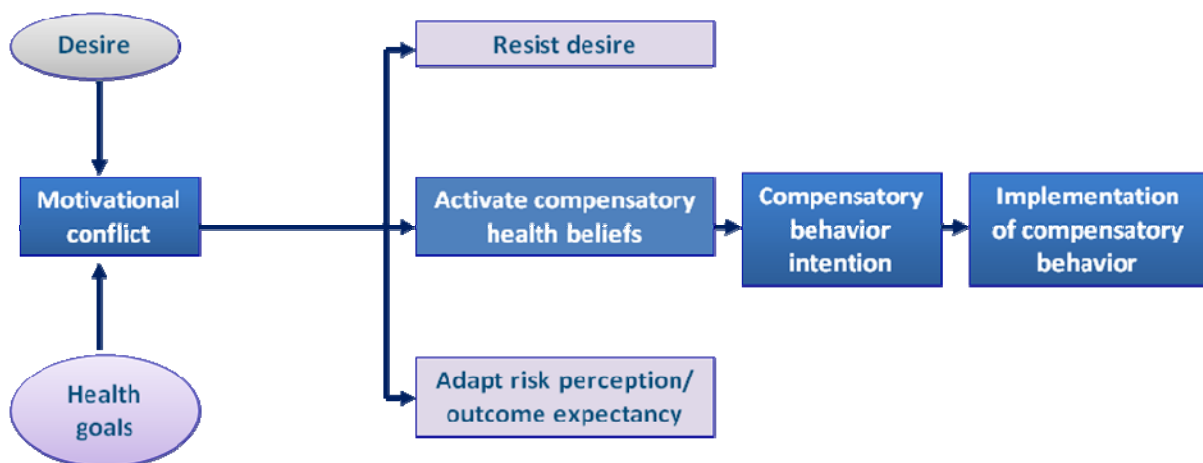


Figure 1. *Compensatory Health Beliefs Model adapted from Marjorie Rabiau et al.*

### 2.1.1 Motivational conflict between desire and health goal

Just the exposure to food can elicit a response of immediate desire. However, it could be that for individuals this desire to indulge conflicts with other longer term health goals, such as maintaining a certain body weight. Motivational conflict is the initial phase that activates the compensatory health beliefs as an individual respond to contradicting intentions. Individuals confronted with temptations of delicious yet high-calorie food may experience an immediate desire of giving in to indulgence. However, when individuals consider their long-term goal of being healthy, which requires eating less calorie foods, individuals can experience a motivational conflict or anticipatory guilt [23]. Goals are desirable future state an individual wants to attain [24]. Particularly dieters want to reduce or at least maintain their present weight. However, our



environment is not of help in achieving this health goal because of prevalent presence of stimuli signaling desirable and caloric food. As previously mentioned, current 'toxic food environment' encourages enjoyment of palatable food that interferes with the health goal of eating control [6, [9, 10]. Exposure to desirable food inhibits eating control making immediate goal or desire of food indulgence more focal. Unconsciously aware the person is being derailed from his/ her health goal and gives in to food indulgence [25].

It is noteworthy to mention that the intensity of conflict depends on strength of desire or cravings, and how a person values the goal. A less determined person with regards to one's health goals has more probability of giving in to food indulgence [13]. According to studies [26, 27] health and taste goals are both considered in a single eating consumption episode. In this regard, hedonic foods are usually associated with taste goal while utilitarian food with health goals which conflicts while people consider both in a single instance of eating experience [28]. Immediate desire of indulgence to high-calorie food conflicting with long term goal of being healthy can be further explained by cognitive dissonance, which takes place when an individual is faced with conflicting beliefs or opinions. Individuals in state of cognitive dissonance tend to seek consistency on their behaviour in order to alleviate the inconsistency or unpleasant state [29]. Mechanism to cope with motivational conflict is trade-off between goals. After a high-calorie indulgence to satisfy desire goal is highly likely followed by intention to eat healthier to achieve balance or consistency [30].

### **2.1.2 Strategies to deal with the motivational conflict between desire and health goal**

#### *1) Activate compensatory health beliefs*

Motivational conflict actually triggers the formation of compensatory beliefs as a person realizes that the desired behaviour may cost one's health goals. Compensatory Health Beliefs (CHBs) are beliefs that negative effects of an unhealthy behaviour can be compensated for, or neutralized by engaging in another healthy behaviour [13]. Previous research showed that CHBs hinder an individual's success at positive health behaviour change, and this belief also explains why many people fail to adhere to behaviour change programs such as dieting and exercising [13].

Prior to indulgence, an individual may activate compensatory health beliefs in order to justify his unhealthy behaviour of giving in to luscious but high-fat food. CHBs may also be formed after indulgence to reduce or eliminate the negative affect or feeling of guilt. Activation of compensatory health belief is a means of rationalization that an individual uses to adhere to long-term goal of staying healthy despite the indulgence to unhealthy food. Hence, compensatory health behaviour will not be activated or formed without the conflict state due to contradicting desire and goal [13].

#### *2) Resist desire*

Self-control efficacy or ability to resist desire is regulated by moving away from pain (laborious exercise) and moving towards a pleasure (indulgence to luscious food) [31]. Aside from these external factors on resisting desire, resistance to desire is more likely to happen when strength of

temptations of indulgence and cravings is not strong and also when a person gives high regard of his/ her health goals [13].

### *3) Adapt risk perception / outcome expectancy*

Changing one's health beliefs is another strategy that individuals can use when confronted with temptations of indulgence. In order to justify the indulgence of high-fat food, the importance of the goal is reduced. For example, although research has shown that overweight and obesity impose heart ailment, a person may think that eating of high caloric food and not exercising is not that bad and will not seriously contribute to heart ailment. This is done to rationalize food indulgence [13].

Reduction of the importance of long-term health goal is a way of making an excuse which is a coping strategy to achieve consistency. Resisting desire and adapt risk perception are both attributed to self-control [32].

### **2.1.3 Compensatory behaviour intentions**

Once the CHB has been activated, for it to successfully reduce the motivational conflict it requires creation of an intention to perform the CHB. Compensatory intentions can be formed before indulgence. In that way, compensatory intentions are a kind of health-oriented plans to justify giving in to temptations. However, compensatory behaviour intentions can also be formed as a means of relieving guilt after indulgence [13]. So, compensatory intentions are health-oriented plans a person elicits before or after eating a luscious yet high-fat food. , one uses compensatory behaviour intention to justify indulgence in order to alleviate feeling of guilt.

Kronick and Knauper studied compensatory intentions on the mind of dieters when being confronted with a cookie [15]. Dieters were randomly divided into two conditions. In the conflict condition cookies were labeled as cookie A or cookie B and "high calories" or "low calorie". While in the conflict-free condition cookies were labeled as cookie A or cookie B but both labeled as "low calorie". The low calorie cookie was made light brown and the high calorie cookie was made dark brown to maximize the degree of temptation. Also, participants were told that other participants had said that the high fat, high sugar cookies delicious tasting while the low fat, low sugar cookies were not very good. Results showed that dieters in the conflict condition demonstrated stronger endorsements that compensatory intentions are on their mind than those in the conflict-free condition. Compensatory intentions are formed as a reaction to the mental conflict experienced in temptation situation. Hence, compensatory intentions were a significant predictor of choosing the high calorie cookie for consumption. Using compensatory intentions as a strategy to cope with temptations, individuals may allow themselves to indulge [15].

Whether intentions actually translate into behaviour is determined by various factors. Two important aspects are again 'self-efficacy' and 'implementation intentions'. Gollwitzer (1999) [33] linked intention-behaviour, for an instance going on a healthy diet is stronger when people are asked to formulate plans in the form of implementation intentions as it translates goals to performance or action. Implementation intentions support compensatory intention of an advance

plan specifically, when, where and how an individual is going to make definite actions towards goal of being healthy. Whereas, compensatory health belief does not include a concrete plan on how an individual is going to implement the intended behaviour [13].

Before or after indulgence people may form compensatory behaviour intentions by eating less (less calorie, smaller portion, limiting or avoiding sweets and snacks), eating plenty of fruits and vegetables, and engagement in physical activities or exercise [34, 35].

#### **2.1.4 Implementation of compensatory behaviour**

The intention to compensate for additional calorie intake when being confronted with a high caloric food can be either carried out or left unaccomplished. Whether intentions actually translate into behaviour is determined by various factors. According to the model of Rabiau, two important aspects are again 'self-efficacy' and 'implementation intentions'. Implementation intentions are if-then plans that link situational cues with responses necessary to obtain the desired outcome [33].

As previously mentioned, compensatory intentions differ from implementation intentions as the latter consists of a concrete and detailed plan on how to achieve a goal. As opposed to compensatory intentions wherein the means of achieving the desired goal is not defined. Considering the link of intention and behaviour, intentions only account for 20% to 30% of variance in behaviour. Consistent to Ajzen's theory of planned behaviour that motivation, intention and attitude are linked to behaviour [36]. Successful achievement of health behaviour intentions or goals includes how to start, persistence to work on progress with preparations on how to deal with distractions until the goal is achieved [37].

Implementation intentions translate goals to performance or action. As implementation intentions supports compensatory intention of an advance plan when, where and how are you going to take specific actions towards the goal of being healthy [38]. The difference between formed compensatory intentions and implementation intentions is that planning beforehand elicits linkage of specific cues like time and place. Therefore, individual knows ahead what to do upon encountering a specific cue. Implementation intentions are effective means of carrying out intentions and also the speed of action initiation [39]. Orbell and colleagues [40] conducted a study regarding implementation intentions which proved that implementation intention is an effective scheme in bridging the gap between intention and behaviour. Forming good intentions like eating healthy and losing weight is not an assurance of achieving it. Therefore, dieters with implementation intentions have higher chances of achieving their goal than those who only form compensatory intentions.

Bandura (1997) [41] defined self-efficacy as judgment of one's ability to perform a task within a specific domain. Self-efficacy differs from one person to another on the account of individual's skill level. In addition, motivation, personality and task itself also determines self-efficacy. People who are more confident and believes that they are to achieve the task are more likely to be successful than people who think they are going to fail [42]. Consistent to this, Ingledew et al., (1996) [43] conducted a study on health behaviour change, and found out that a person's efficacy expectations influence their performance of a task. Self-efficacy is an effective measure of health behaviour change and maintenance [43]. The strength of cravings or desires determines

whether CHB will be activated or not, if there is low level of desirability then self efficacy is actualized and CHB is not activated at all. In addition, the value of one's goal has an impact on the amount of conflict posted to a person. Self-determined motivation is more capable of resisting temptations of craving compared to external influence on an individual's health goals.

It is crucial to understand the pertinent factors to compensatory health behaviour. In order to best manage compensatory health behaviour to help address the worldwide phenomenon of overweight and obesity.

### **2.1.5 Restrained eaters**

We expect that the model as shown in Figure 1 might be particularly relevant for restrained eaters. Restrained eaters otherwise known as chronic dieters by Herman & Polivy (1990) [44] are people who regularly maintain their weight and engage in dieting behaviours. Restrained eaters always watch their diet and weight whether they are close or far to their ideal weight. On the contrary, unrestrained eaters control their diet only when they are far from ideal weight [45]. Despite failed attempts of chronic dieters on maintaining their weight and dieting, they constantly managed to get back to weight management practices [46].

As mentioned earlier, food temptations are present in our current "toxic food environment" consequently restrained eaters are proved to be more responsive to environmental cues. Chronic dieters seem to overeat when confronted with desirable food. Since subsequent reaction when faced with food temptation is guided by eating pleasurable food which explains why restrained eaters overeat and experience cravings. Considering the fact that most palatable food are high in calories, it contradicts to the long-term goal of weight management. These are two contradicting goals that cannot be pursued at the same time [47]. A study conducted by Fedoroff and colleagues examined the effect of food cues on eating behaviour of unrestrained and restrained eaters. The research determined that restrained eaters are more sensitive and reactive to food cues compared to unrestrained eaters. In this manner, restrained eaters are urged eat more when they are exposed to food [25].

Study conducted by Papiés (2010) [47] proved that restrained eaters primed of dieting goals regulate their eating behaviour. Priming activates the chronic dieters' long term goal of weight management. It is possible that exercise priming affects not only eating behaviour but also formation of compensatory behaviour.

## **2.2 Hypotheses**

### **Food exposure**

The study of Kronick and Knauper [15] as discussed before, measured compensatory intentions by asking participants whether these intentions to compensate were on their mind when being confronted with a tempting cookie. As such, the study builds on self-reflection of the participants. A limitation of this approach is that not all participants might be able or willing to express their compensatory tendencies. Another disadvantage is that this reflection may change the actual experience [48].

In the present research, we aim to identify compensatory intentions by manipulating the exposure to foods at the moment that an individual is indicating one's personal intentions to exercise, eat less and healthier. Participants were presented not only with tempting food but were also informed that the food is for the next taste test study. This made them aware that they could eat the food later. Compared to no food temptation, it is expected that food exposure (while answering the behaviour intention questionnaire) has a stronger impact on motivational conflict in the aspect of desire to food indulgence and consequently development of behavioural compensation. Most importantly, the research will be based on participant's actual formation of compensatory intentions when exposed to food. It is expected that more behavioural intentions will be formed upon the food exposure that elicits temptations.

We also expect that food exposure influences the amount of food people eat. More specifically, people exposed to food while answering the behaviour intention questionnaire have a higher food intake in the subsequent taste test. That is, the longer an individual is exposed to the food, the more desirable it is and the more people will eat. Therefore, hypothesis in the food exposure condition is stated as:

*H1 Compared to people not being exposed to tempting food when filling in the questionnaire, people being exposed to tempting foods*

- ✓ *express higher intentions to engage in exercise today or tomorrow*
- ✓ *express higher intentions to eat healthier or less today or tomorrow*
- ✓ *have a higher food intake in subsequent taste test*

## **Exercise priming**

Research demonstrated that salient cues in the environment related to a person's goal affects how an individual set and pursue this goal. Provided that the cues in the environment are unconsciously made by a person [18, 19]. In example, observation of someone in action triggers an individual to increase in doing the equivalent behaviour [20, 21].

Priming is the nonconscious activation of social structures that influence the subsequent conscious behaviour or judgments. Its effect is proven operative on psychological concepts and processes [49]. Albarracin [50] demonstrated that primes activate action and inaction goals [51]. Action goals are set salient goals of end state of high activity level. Primes that were proved to trigger subsequent conscious action are exposure to action words and exercise promotion messages like posters [22, 51]. Moreover, the research indicated that motivational mechanisms linked with action words or images seem to elucidate in the presence of exercise-promotion messages. Specifically, action words like 'active' and 'go' elicit motor response which can be satisfied with eating [22].

For hypothesis 2, it was noted from the theoretical model that salient cues or primes in the environment related to a person's goal affect how a person pursue this goal. Compensatory intentions are developed in order to make up for the jeopardized health goal. In this regard, salient fitness posters and a home trainer as primes may also influence the formation of behavioural intentions in accord to one's health goal. It can be assumed that salient goal of being healthy can be triggered by exercise primes that induce formation of intentions relatively being active and fit.

Based on theories discussed the study we expect the following:

- Exercise primes stimulate people to have higher intentions to exercise, eat healthier and eat less later that day or the next day. That is because personal health goals are activated by fitness related cues in the environment.
- Exposure to fit body images makes people dissatisfied of their own body weight.
- Fitness prime affects food intake. When people are primed with exercise they eat more in a subsequent indulgent eating occasion.
- When confronted with food, conflicting feelings are less for people who are primed with exercise.
- People primed with exercise have lower compensatory intentions after food consumption compared to those who are in the neutral environment.
- Providing fitness primes activates one's health goals. In this regard, it is presumed that participants primed with exercise would consider a healthy choice of snack as a little present for participating at the experiment.

Exercise primes makes people dissatisfied of their own weight. That is because ideal weight views can be distorted by the sporty and lean images in a typical exercise prime. These exercise materials will unconsciously affect judgment towards oneself. An empirical study was done by Arbour and Ginis [52]. They compared men who were exposed to people with muscular physique images and men who were not exposed to these fitness images. Results showed that the muscular physique images elicited dissatisfaction of their own weight. Alipoor and colleagues conducted a similar study among female students. The study focused on the relationship between physical self-concept and body image dissatisfaction. Women who are dissatisfied of their own weight are those with low self-concept and affected by television's body images [53].

Hence, the study's second hypothesis is stated as:

- H2 Compared to people not being primed with exercise, people primed with exercise:*
- ✓ *express higher intentions to exercise, eat healthier or less today or tomorrow*
  - ✓ *feel dissatisfied of their own body weight*
  - ✓ *eat more in a subsequent indulgent eating occasion*
  - ✓ *report lower conflicting feelings regarding the moment they are confronted with tempting foods*
  - ✓ *indicate lower compensatory intentions after consumptions*
  - ✓ *more often choose a healthy snack as present for participating in experiment*

## CHAPTER

# 3 Methodology

### 3.1 Participants

A total of 128 female students of Wageningen University participated in the study received a present. As there is evidence that women are more concerned with dieting and losing weight behaviours than men [54, 55], we included only female participants in the study. During the recruitment participants were told that the study was about women's health behaviour as a cover story.

As a manipulation check, at the end of the study participants were asked if they knew study before entering the research room that they would get food to taste. Four participants in the no food exposure condition were excluded in the sample population as they already knew they would get food to taste beforehand. Two participants were eliminated because they are allergic to milk and could not eat the served foods. Another participant was excluded because she was not able to finish the post-consumption questionnaire. One participant was not included in the sample population as her exercise activities computed by GLTEQ deviate more than the four conditions' standard deviations from the mean exercise score.

### 3.2 Procedure and materials

Between subjects design was carried out which employed a two (food exposure: no food exposure versus food exposure) by two (exercise priming: yes versus no) experimental designs. Participants were randomly assigned to the experiment's four conditions, which are; 1) no food exposure and neutral environment 2) no food exposure and exercise-primed environment 3) food exposure and neutral environment 4) food exposure and exercise-primed environment.

Participants were welcome and thanked, and were asked to sit down at individual cubicles. The first part of study is filling out of behaviour intention questionnaire, wherein participants are either exposed to food or not. Food exposure is the first factor that was manipulated in the study. Apple cookies, mini pastry puffs and mini chocolate muffins are placed in front of the participants in the food exposure condition. The participants were instructed not to eat it until the first (behaviour intention) questionnaire had been filled in.

The second factor that was manipulated is the environment wherein participants fill in their questionnaire and taste the food. Half of the participants fill in the questionnaire in a neutral room (ordinary furniture). While the other half of the participants fill in the questionnaire in an exercise environment. The study room was set up with a home trainer and exercise promotion poster (11 x 20 inch) in each of the participant's cubicle. In addition to the exercise arrangement,

participants were given sports cap bottled water whereas in the neutral condition participants were served of bottled water with ordinary cap.



*Figure 2* Pictures of the exercise prime in the research room

The second part of the study consisted of the eating task. In this regard, the experiment did not take place close after lunch or breakfast, as it is less likely that participants have a desire for a particular food during those times. Participants invited were asked to come at morning session at 10:00 or 11:00, or afternoon session at 14:00 or 15:00. As a cover story for the eating task, participants were told that it was unrelated study for a Dutch bakery firm. The total amount of food given to the participants was identical. All were provided of 60 grams (240 calories) of apple cookies, 56 grams (237 calories) of pastry puffs, and 40 grams (111 calories) of mini chocolate muffins. Participants were instructed to eat as little or as much as they want. Simultaneously participants answered a taste test questionnaire regarding texture, smell among other dimensions.

The experimenter took the left-overs and weighed the leftovers out of sight of the participants. Leftovers were weighed using an Inventum digital weighing scale. Grams of consumed baked products were converted into calories (apple cookies was 400 calories per 100 grams, pastry puffs was 423 calories per 100 grams and mini chocolate muffin was 277 calories per 100 grams).





*Figure 3* Picture of the food provided to each participant

After the eating task, the post-food questionnaire was provided to each of the participants. Wherein participants indicated their satiety rating, background and demographic information, compensatory intentions formed after food consumption, frequency of exercise on a weekly basis, self-esteem scale, mood scale, self-control scale, restrained eating scale, impulsiveness, and exercise motivation scale. These items were included as it may also affect formation of compensatory intentions and total calorie intake.

Female students participated in the study in exchange for a little present. At the end of the study, participants made a choice between Pringles paprika and Albert Heijn's light muesli apple & raisin bars as a complimentary gift. Experimenter recorded each of the participants choice.



*Figure 4* The choices that participants could pick as a departing gift. At the left the relatively unhealthy Pringles chips and at the right the relatively healthy light muesli bars.

### 3.3 Measures

The present study measured the key constructs of compensatory health beliefs model adapted from Rabiau et al. [13] as explained in the theoretical framework chapter. The main difference is that the study manipulated food exposure and exercise priming to determine the variance of constructs between experiment groups.

#### Desire

As illustrated in the Compensatory Health Beliefs Model adapted from Rabiau et al. [13] the primary phase in formation of compensatory behaviour intention is motivational conflict brought by opposing goals of immediate desire and long-term health goals. To assess the desirability of the apple cookies, pastry puffs and mini chocolate muffins, the eating task was coupled with a taste test questionnaire. Through a 7-point likert scale cognitive aspects, each pastry was rated such as looks nice, tastes nice, good texture and smell nice. Cognitive scale of each pastry obtained an acceptable internal consistency (apple cookies Cronbach's alpha = 0.78, pastry puffs Cronbach's alpha = 0.78, chocolate muffin Cronbach's alpha = 0.71). In addition to measurement of desirability of food served, participants were asked whether each pastry is tempting and if it makes them hungry. This measure of desire towards the food acquired a sufficient internal consistency (apple cookies Cronbach's alpha = 0.84, pastry puffs Cronbach's alpha = 0.79, chocolate muffin Cronbach's alpha = 0.69). Aside from measuring the desire of participants to the food served, the taste test questionnaire is also a means of protecting the cover story that the second part of the research is unrelated study for a Dutch bakery firm. In this regard, willingness to buy the products is included in the questionnaire.

#### Health goals

To determine whether respondents have health goals it was asked in the post-consumption questionnaire if they are currently on a weight loss diet. The answer 1 corresponds to not at all (n = 63) and 2 to 5 is a little bit to very much (n = 57). Moreover, health goals of participants were verified in terms of frequency of engagement to physical activities per week was accounted for to compute the Godin Leisure Time Exercise Questionnaire (GLTEQ) total leisure activity. Scheme to calculate for the total leisure activity is: (frequency of mild exercise per week x 3 + frequency of moderate exercise per week x 5 + frequency of moderate exercise per week x 9). GLTEQ was found to have good 2 week test – retest reliability and construct validity [56].

#### Activate compensatory health beliefs – Motivational conflict

Contrasting goals of immediate food desire and long-term health goals cause motivational conflict. Consequently, motivational conflict triggers or activates compensatory health beliefs. To measure conflicting feelings of respondents upon food confrontation the following items adapted from Rabiau et al.[13] were rate by participants: 1) felt guilty when I ate the pastries but it looked delicious 2) wanted to eat the food, but should not have eaten it 3) had conflicting feelings at the moment when confronted with food. The average answers for the three questions was computed and used as index of experienced conflicting feelings which obtained a sufficient internal consistency of Cronbach's alpha = 0.78.

### Resist desire

One important dependent measure of interest is the total calorie consumed during the “taste test” task. As it can be figured out from the amount of calorie intake if participants chose the path of resist desire in response to motivational conflict due to desire and health goals. Respondents opting for this route of resist desire the moment they experienced motivational conflict would tend to eat as little as they can. According to the descriptive statistics with total calories consumed as the variable, the mean and standard deviation of calories consumed of the sample population (N=120) is 217.42 (109.08). The minimum calorie consumed is 16.33 which practically means that respondents with extremely low calorie consumption followed that route of resist desire. In the post-meal questionnaire it was also inquired from the respondents if they want to resist food temptations better through a 7-point likert scale. Furthermore, self-control scale that may affect individual’s ability to resist desire is included in the post-food questionnaire.

### Compensatory behaviour intention

In the pre-food taste questionnaire, participants revealed their likelihood of different compensatory behavioural intentions with regards to exercise and food choice in a scale of 1 (strongly disagree) to 7 (strongly agree) which was adopted from Wammes and colleagues [17]. In every behavioural intention item the time difference of execution of the plan was asked particularly for today and tomorrow. Three behavioural intentions pertaining to physical activity or exercise were asked. These are likelihood of 1) low-intensity physical activity (e.g. yoga, walking) 2) going to the gym for work-out 3) high-intensity physical activity (e.g. running). The reliability analysis for the items related to exercise obtained a Cronbach’s alpha of 0.67. Likelihood of reduction of food consumption was asked as 1) eating less at next meal 2) eat less snacks in between meals 3) limiting sugar intake and avoid sweet foods. Eating less compensatory behaviour intentions obtained a good reliability as Cronbach’s alpha = 0.86. Behavioural intentions on healthy food choice were asked, that were 1) healthier meal choice 2) eating a lot of fruits and vegetables. The construct compensatory behaviour intentions on healthy food choice was found to be acceptable Cronbach’s alpha = 0.66. We also included the intention to eat fast food (e.g. hamburger, pizza and fries) in the questionnaire (Cronbach’s alpha = 0.65).

Compensatory intentions formed after eating (post-meal questionnaire) were verified by using Kronick and Knauper’s five compensatory intention items; 1) eat pastries but eat less in the meal 2) eat pastries but consider it as next meal 3) eat pastries but cut back later 4) eat pastries but eat less tomorrow and 5) eat pastries then engage in sports later. Participants were asked if these items were on their mind when they were confronted with food. The calculated average endorsement of having compensatory intentions was used as index, which obtained a sufficient internal consistency (Cronbach’s alpha = 0.77).

### Implementation of compensatory behaviour

The present study verified the implementation of compensatory behaviour in terms of healthier food choice after food indulgence. The end-present of the study for participation is a choice between relatively unhealthy potato chips and relatively healthy muesli bars. Participants picking

the muesli bars as complimentary gift can be accounted as immediate implementation of healthier food choice which is one of the compensatory health behaviour items in actual implementation.

#### Other relevant measures

After the eating task, participants filled in a questionnaire related to their eating experience. Satiation-related items were inquired from the participants: 1) I cannot eat another bite of food 2) I feel full at the moment.

Post-meal questionnaire also includes Heatherton & Polivy state self-esteem scale by answering 1 for strongly agree to 7 for strongly disagree in items that participants feel at the moment. Overall liking of the eating experience and mood how the participants feel during the time of experiment were rated using positive and negative affect scale (PANAS). Participants furthermore reported their weight and height for the computation of Body Mass Index (BMI). The post-meal questionnaire also includes scale on self-control and impulsiveness.

As people have their own reason for engagement in physical activity, exercise motivation scale was determined by a 7-point likert scale of strongly agree to strongly disagree. Items asked were; 1) I exercise to improve my performance 2) I exercise because I like it 3) I exercise to stay healthy and fit 4) I am good at sports [57]. Average score was used as index of exercise motivation which obtained a moderate internal consistency (Cronbach's alpha = 0.67) [58]. The item 'I exercise to lose weight' was used separately. Using 10-item scale of Polivy, Herman and Warsh restrained eating score of each participant was derived. Reliability of 10-item scale measuring restrained eating score was computed and obtained a Cronbach's alpha of 0.86, which indicates a high level of internal consistency. Participants answered a 5-point likert scale of never to always. The average restrained eating score of the sample population is 2.71. Among the 120 participants 57 are restrained and 67 are nonrestrained eaters.

### **3.4 Data analysis**

SPSS version 17.0.2 for Windows statistical package was used to analyze the data collected. Analysis of Variance (ANOVA) was used to determine whether randomization was successful between experiment conditions on time since participant had last eaten, BMI and restrained eating style. Also, the effect of food exposure and exercise prime on behavioural intentions, food intake and post-consumption compensatory intentions were determined by carrying out ANOVA. For the appropriateness of the dataset, the constructs were analyzed for reliability. The measure of Cronbach's alpha was used by which the value of  $> .65$  was taken acceptable for all constructs. For all analyses the significance level of  $\alpha < .05$  was adopted. Regression analyses were run to explore the relationship between variables. Wherein the Pearson's  $r$  and  $p$  value/ $\alpha$  were used as a guide to figure out the relation of constructs.

## CHAPTER

# 4 Results

### Manipulation checks

The total number of valid responses or participants is 120 (N=120). Participants mean age is 21.4 (SD=2.4) ranging from 17 to 31 years of age. Mean Body Mass Index is 21.8 kg/m<sup>2</sup> (SD=2.6). There was no shown difference in age and BMI in between groups.

GLTEQ total leisure activity score is significant at  $p = .02$ ,  $F(1,120)=6.02$  in exercise primed conditions, therefore this was included as covariate in the analysis. Time since last food intake of participants differed between conditions, hence it was also included as a covariate. Session (morning or afternoon) as well was considered as a covariate. Reported mood, exercise motivation, restrained eating style and BMI did not differ between conditions (all  $ps > .29$ ).

### 4.1 (H1) Overall effect of food exposure on behavioural intentions and food intake

The study's first hypothesis is that compared to people not being exposed to tempting food when filling in the questionnaire, people being exposed to tempting food express higher intentions to engage in exercise today or tomorrow. Also, people exposed to palatable foods express higher intentions to eat healthier or less today or tomorrow. ANOVA was carried out with food exposure and exercise priming as fixed factors, with time since last eaten and session as covariates. In the analysis of exercise behavioural intentions GLTEQ total leisure activity was included as covariate. *Table 1* shows the results of this analysis. The analysis showed that exercise behavioural intentions were not significantly different between the two food exposure conditions ( $p = .31$ ). Similarly, the expected increased intentions to eat healthier or less today or tomorrow when exposed to food were found to be not significant ( $p = .84$ ).

Interestingly, the analysis showed that participants exposed to food expressed a higher likelihood of eating fast food like hamburgers, fries and pizza today and tomorrow. In particular, food exposure while filling out the behavioural intention questionnaire led to a higher mean likelihood of eating fast food (M=2.32, SD=2.02) compared to those who are not exposed to food (M=1.54, SD=0.99),  $F(1,118)=10.44$ ,  $p < .01$ ). The plot is presented in *Figure 5*.

The hypothesis that people exposed to food when filling the behaviour intention questionnaire will have a higher food intake in a subsequent taste test was not confirmed for all three food types and overall food intake. Only for the chocolate muffins this hypothesis was confirmed, participants exposed to food had a significantly higher intake of mini chocolate muffins  $F(1,118)=4.14$ ,  $p = .04$ ). This practically means that relationship between food exposure and actual calorie consumption does exist. If a person is exposed to food and become aware of an

upcoming eating task, there is a tendency to eat more compared to those who are unexposed to food. In *Table 2* the mean and corresponding standard deviation of food consumption is presented. Relatively mediated by food evaluation on how participants perceive each pastry (see *Table 3*).

*Table 1.* Mean (SD) of pre-consumption behaviour intention items

Pre-consumption behaviour intention items	Food exposure		No food exposure		P value Food exposure	P value Exercise priming	P value Food exposure * Exercise priming
	Exercise prime	No exercise prime	Exercise prime	No exercise prime			
<i>Likelihood of low-intensity physical activity</i>							
today	3.83 (2.33)	4.45 (2.28)	4.50 (2.16)	4.77 (2.20)	.51	.60	.53
tomorrow	4.34 (2.14)	4.24 (2.11)	4.40 (1.87)	5.00 (1.74)	.50	.79	.41
<i>Likelihood of high-physical activity</i>							
today	2.07 (1.81)	3.42 (2.55)	2.73 (2.39)	2.50 (2.08)	.76	.42	.05
tomorrow	3.03 (2.03)	3.18 (2.13)	3.17 (2.41)	4.23 (2.20)	.25	.37	.30
<i>Likelihood of going to the gym and work-out</i>							
today	2.45 (2.20)	3.33 (2.85)	2.90 (2.62)	2.73 (2.38)	.96	.61	.27
tomorrow	2.86 (2.23)	2.61 (2.29)	3.07 (2.45)	3.77 (2.25)	.13	.87	.29
<i>Likelihood of healthier meal choice</i>							
today	4.00 (1.69)	4.30 (1.81)	4.33 (1.84)	4.19 (1.83)	.77	.78	.51
tomorrow	4.14 (1.53)	4.88 (1.36)	5.10 (1.54)	4.38 (1.52)	.33	.99	.01
<i>Likelihood of eating a lot of fruits and vegetables</i>							
today	4.18 (1.79)	3.58 (1.80)	3.87 (2.13)	3.73 (1.84)	.61	.40	.52
tomorrow	4.21 (1.64)	4.03 (1.76)	3.63 (1.92)	3.88 (1.80)	.23	.83	.52
<i>Likelihood of eating less</i>							
today	3.31 (1.98)	3.79 (1.87)	3.40 (1.65)	3.65 (1.87)	.93	.25	.80
tomorrow	3.34 (1.78)	3.88 (1.80)	4.07 (1.51)	3.96 (1.91)	.19	.46	.35
<i>Likelihood of eating less snacks in between meals</i>							
today	3.24 (2.08)	3.52 (1.94)	3.43 (1.91)	3.27 (1.51)	.89	.73	.56
tomorrow	3.48 (1.94)	3.73 (1.74)	3.60 (1.79)	3.27 (1.28)	.60	.96	.38
<i>Likelihood of limiting sugar intake and avoid sweet foods</i>							
today	3.00 (1.91)	3.55 (2.03)	3.40 (1.84)	2.85 (1.83)	.64	.89	.13
tomorrow	3.52 (1.86)	3.76 (1.56)	3.70 (1.76)	3.12 (1.84)	.48	.67	.22
<i>Likelihood of eating fast food like hamburgers, fries, pizza</i>							
today	2.24 (1.92)	1.64 (1.34)	2.06 (1.68)	1.19 (.40)	.29	.01	.62
tomorrow	3.00 (1.31)	1.73 (1.53)	1.77 (1.25)	1.27 (.45)	.01	.00	.18

Table 2. Mean (SD) of food intake in calories (n = 118)

Food served	Food exposure (n=62)		No food exposure (n=56)		P value
	Exercise prime (n=29)	No exercise prime (n=33)	Exercise prime (n=30)	No exercise prime (n=26)	
apple cookies	85.65 (51.98)	97.09 (63.79)	69.07 (55.13)	80.92 (64.17)	.21
pastry puffs	78.51 (54.56)	97.77 (61.28)	71.24 (48.01)	84.97 (59.02)	.57
chocolate muffin	57.03 (27.33)	50.62 (34.98)	40.14 (24.42)	44.61 (24.64)	.04

Table 3. Mean (SD) of food evaluation (n = 118)

Food evaluation criteria	Food exposure (n=62)		No food exposure (n=56)		P value Food Exposure
	No exercise prime (n=33)	Exercise prime (n=30)	No exercise prime (n=33)	No exercise prime	
<i>apple cookies</i>					
makes participant hungry	3.43 (1.71)	3.76 (1.62)	4.13 (1.36)	3.62 (2.02)	.20
very tempting	4.07 (1.75)	4.52 (1.64)	4.73 (1.70)	4.08 (1.94)	.52
tastes nice and delicious	5.00 (1.39)	5.12 (1.62)	5.17 (1.46)	5.12 (1.86)	.72
smells nice	5.00 (1.22)	4.76 (1.58)	5.17 (1.31)	4.73 (1.64)	.97
looks nice	4.97 (1.48)	5.15 (1.40)	5.23 (1.25)	5.19 (1.52)	.45
good texture	5.32 (1.31)	5.21 (1.65)	5.37 (1.16)	5.19 (1.47)	.84
certainly buy	3.21 (1.99)	4.00 (1.85)	3.93 (1.31)	3.58 (1.88)	.45
<i>pastry puffs</i>					
makes participant hungry	3.48 (1.82)	3.91 (1.85)	4.17 (1.58)	3.65 (1.52)	.34
very tempting	4.55 (1.66)	4.66 (1.81)	4.80 (1.63)	4.50 (1.92)	.84
tastes nice and delicious	5.03 (1.55)	4.84 (1.44)	4.70 (1.47)	4.81 (1.39)	.63
smells nice	3.28 (1.31)	3.53 (1.52)	4.14 (1.16)	3.69 (1.49)	.10
looks nice	5.17 (1.48)	4.91 (1.51)	5.13 (1.46)	4.85 (1.59)	.77
good texture	4.52 (1.72)	4.65 (1.82)	4.73 (1.36)	4.58 (1.70)	.87
certainly buy	3.38 (1.82)	3.81 (1.92)	3.67 (1.71)	3.58 (1.96)	.88
<i>chocolate muffin</i>					
makes participant hungry	3.76 (1.83)	3.44 (1.64)	3.80 (1.63)	3.77 (1.63)	.45
very tempting	4.48 (1.68)	4.00 (1.87)	4.10 (1.60)	4.58 (1.68)	.72
tastes nice and delicious	4.97 (1.52)	4.33 (1.69)	4.33 (1.49)	4.85 (1.43)	.98
looks nice	4.55 (1.59)	3.91 (1.66)	4.10 (1.54)	4.73 (1.48)	.45
good texture	4.55 (1.53)	4.36 (1.76)	4.87 (1.28)	4.73 (1.40)	.31
smells nice	4.76 (1.40)	4.27 (1.70)	4.43 (1.50)	4.00 (1.39)	.33
certainly buy	3.00 (1.73)	2.91 (1.53)	2.70 (1.53)	3.35 (1.62)	.70

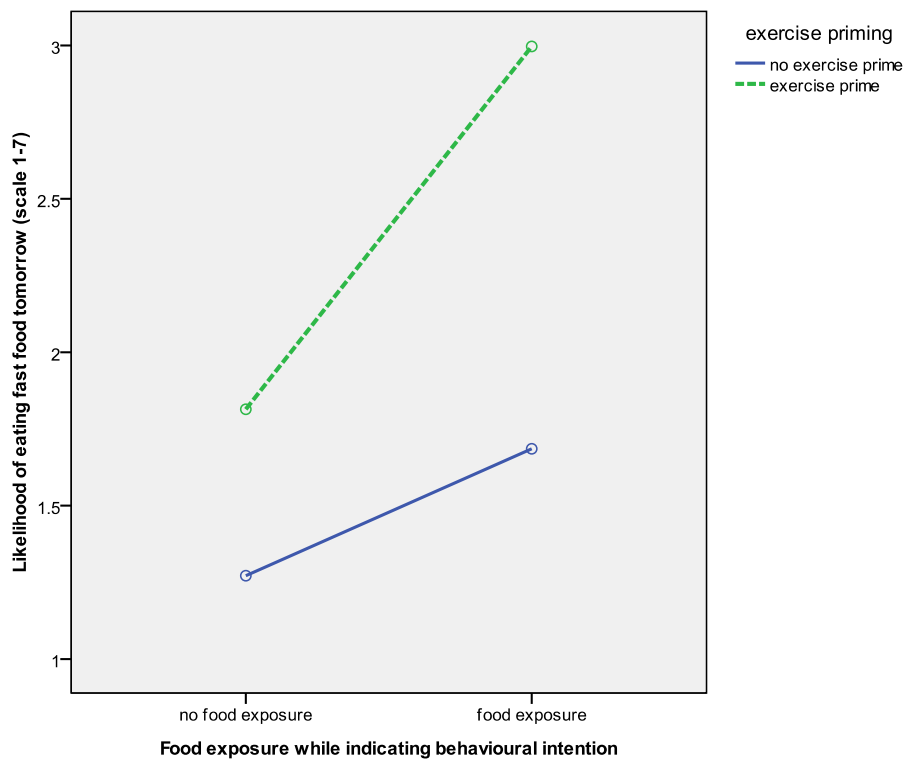


Figure 5 Mean likelihood of eating fast food tomorrow as a function of exposure to food and exercise priming ( $p < .01$ )

#### **4.2 (H2) Overall effect of exercise priming on behavioural intentions, food intake, motivational conflict experienced and compensatory intentions**

Participants primed with exercise were expected to express higher intentions to exercise, eat healthier or less today or tomorrow compared to participants without fitness cues. The expected difference between groups was not significant based on the analysis. The analysis showed that exercise behavioural intentions were not significantly different between the two exercise priming conditions ( $p = .45$ ). Similarly, the expected increased intentions to eat healthier or less today or tomorrow when primed with exercise were found to be not significant ( $p = .92$ ). However, the interaction of food exposure and exercise priming was found to be significant regarding the following single items; likelihood of high-intensity physical activity today and likelihood of healthier meal choice tomorrow. Participants scored significantly lower on both behavioural intentions when exposed to food and exercise priming. Participants have lower likelihood of high-intensity physical activity today ( $F(1,118)=4.01, p < .05$ ) on interaction of food exposure and exercise priming. To illustrate the interaction, a plot is presented in Figure 6. A similar interaction was found regarding the likelihood of making a healthier meal choice upon food exposure and exercise priming interaction today ( $F(1,118)=6.82, p < .01$ ) (Figure 7). Interaction



of food exposure and exercise prime seem to cause decrease in behavioural intentions of exercising and eating healthier meal.

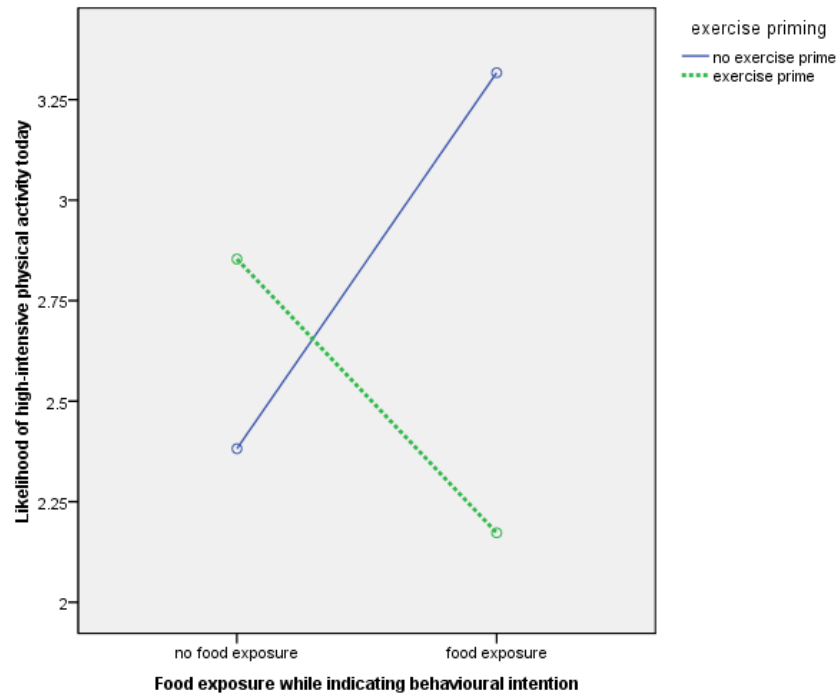
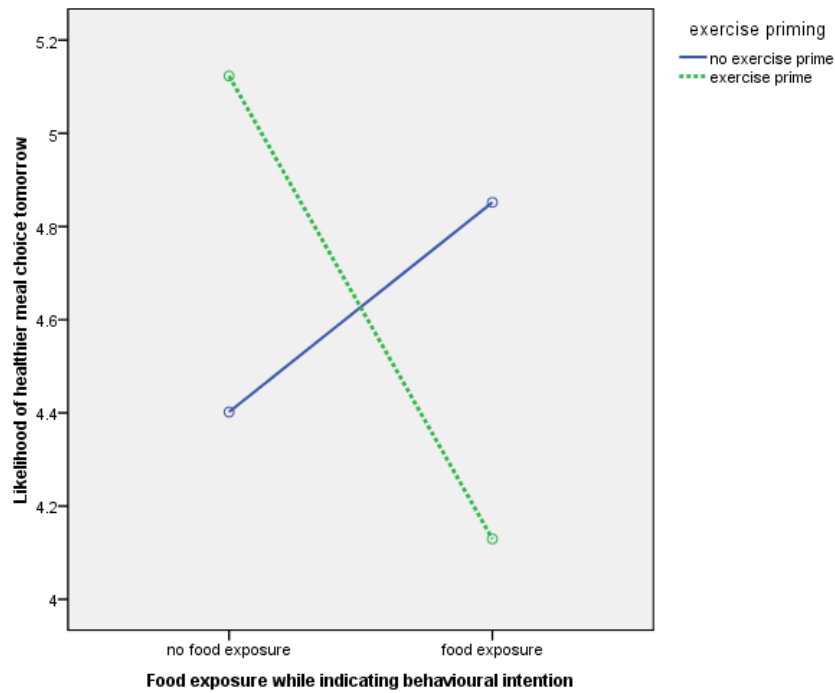


Figure 6 Mean likelihood of high-intensity physical activity today as a function of exposure to food and exercise priming ( $p < .05$ )



*Figure 7* Mean likelihood of healthier meal choice tomorrow as a function of exposure to food and exercise priming ( $p < .01$ )

A notable finding was that exercise priming had a significant effect on likelihood of eating fast food like hamburgers, fries and pizza today. It was shown that this behavioural intention is higher ( $M=2.15$ ,  $SD=1.79$ ) with exercise priming compared to participants without exercise prime ( $M=1.44$ ,  $SD=1.06$ ),  $F(1,118)=7.52$ ,  $p < .01$ ) (see *Figure 8*). Moreover, environmental cues of staying healthy through exercise posters and a home trainer had the same effect on likelihood of eating of fast food like hamburgers, fries and pizza tomorrow. Exercise primed participants have significantly higher likelihood of eating fast food tomorrow ( $M=2.37$ ,  $SD=1.94$ ) compared to participants that fill out the behaviour intention questionnaire in a neutral environment ( $M=1.53$ ,  $SD=1.19$ ),  $F(1,118)=10.44$ ,  $p < .001$ ).

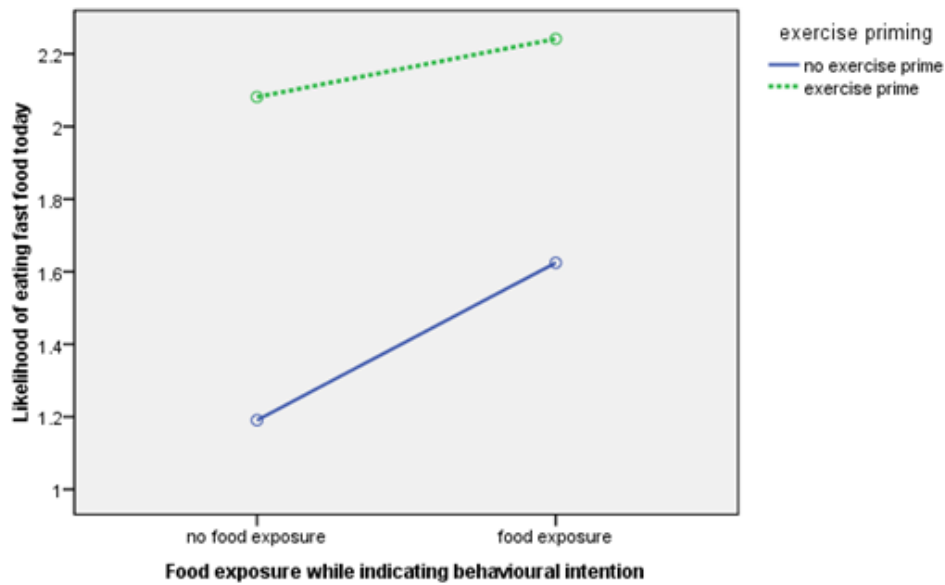


Figure 8 Mean likelihood of eating fast food today as a function of exposure to food and exercise priming ( $p < .01$ )

It was established in the study that exposure to exercise posters makes participants dissatisfied of their own weight ( $F=4.420, p = .04$ ).

It was assumed that participants primed with exercise would eat more in a subsequent indulgent eating occasion. However, the results obtained do not confirm this hypothesis that fitness primes increase food intake. See Table 1 Mean (SD) of food intake on the different experiment conditions.

Participants primed with exercise compared to those in the neutral environment are expected to report lower conflicting feelings when they are confronted with tempting foods. Considering the analysis made between groups conflicting feelings when confronted with food in the exercise primed condition was found to be not significantly lower (see Table 4).

Table 4. Mean (SD) conflicting feelings when confronted with food

Conflicting feelings items	Food exposure		No food exposure		P value Exercise Priming
	Exercise prime	No exercise prime	Exercise prime	No exercise prime	
want pastries but should not have eaten it	3.72 (2.20)	3.39 (1.73)	3.70 (1.88)	3.81 (1.79)	.87
felt guilty eating the pastries, but it looked delicious	3.00 (1.46)	2.52 (1.48)	2.90 (1.81)	2.92 (1.41)	.49
would not have eaten so much	3.31 (2.04)	2.97 (1.60)	3.07 (1.70)	2.81 (1.27)	.26

Among the hypotheses in the exercise-primed condition is that participants would exhibit lower compensatory intentions after food consumption in comparison to those who are in the neutral environment. The present study does not confirm the mentioned assumption, mean (SD) of post-compensatory intention items between experiment conditions is presented in *Table 5*. A trend was observed in the post compensatory intention item ‘eat pastries but eat less in the next meal’ as it produced a  $p$  value = .055 that is reasonably close to significance level. The trend indicates that participants in the exercise primed condition reported lower intentions to ‘eat pastries but eat less in the next meal’ compared to those in the no exercise prime condition (see *Table 5*).

*Table 5.* Mean (SD) of post-compensatory intention items

Post-compensatory intention items	Food exposure		No food exposure		P value Exercise priming
	Exercise prime	No exercise prime	Exercise prime	No exercise prime	
eat pastries but eat less in the next meal	2.10 (1.50)	2.52 (1.91)	2.00 (1.46)	2.65 (1.64)	.06
eat pastries but consider it as next meal	1.59 (1.12)	1.67 (1.11)	1.53 (1.17)	1.31 (.55)	.67
eat pastries but cut back later	2.48 (1.84)	2.94 (2.08)	2.57 (1.91)	3.15 (1.85)	.13
eat pastries but less tomorrow	1.66 (1.26)	2.00 (1.68)	1.73 (1.34)	2.15 (1.67)	.14
eat the pastries then engage to sports to make up for it	2.62 (1.82)	2.39 (1.84)	2.93 (2.21)	2.81 (1.92)	.68

Lastly, considering that fitness primes activates one’s health goals, it was presumed that participants primed with exercise would pick a healthy choice of snack as end-present. This hypothesis was not proved based on Chi-Square test ( $\chi^2 = .00$ ,  $p = 1.00$ ) it was found out that choice between muesli and Pringles have no statistical difference.

### **4.3 Food exposure and exercise priming on restrained eaters**

Using regression analysis it was found out that total calories consumed was significantly positively correlated with restrained eating ( $r = .22$ ,  $p = .02$ ). Restrained eating was also found to be significantly positively correlated with BMI ( $r = .26$ ,  $p = .00$ ). Consistent to this finding, restrained eater was also correlated with dissatisfaction with own weight ( $r = .41$ ,  $p = .00$ ).

Restrained eating scores did not differ between study groups ( $p = .90$ ) indicating that randomization of participants was successful in this respect. The effect of restrained eating to formation of compensatory intentions was determined by analysis of variance. Each of the compensatory behavioural intentions was tested as the dependent variable, food exposure, exercise prime and median split of restrained eating score as independent variables, and time last eaten and session as covariates.

The main effects of the median split of restrained eating style were significant in the following pre-food consumption cases: likelihood of healthier meal choice today ( $p = .03$ ), likelihood of eating less today ( $p = .02$ ) and tomorrow ( $p = .02$ ), and likelihood of eating of fast food like hamburgers, fries and pizza today ( $p = .04$ ). Whereas, median split of restrained eating style were found to be significant on the following post-food consumption compensatory intention items: eat the pastries but eat less in the next meal ( $p = .00$ ), eat the pastries but cut back later ( $p = .00$ ), and eat the pastries then engage to sport so make up for it ( $p = .00$ ).

Overall, highly restrained eaters did not respond differently to the food exposure manipulation compared to low restrained eaters (see *Table 6*). Similarly, high restrained eaters did not respond differently to the exercise primes than low restrained eaters, except in the following instances. In particular, the median split of restrained eating style was also found to interact with exercise prime with regard to the pre-consumption behavioural intention to limit sugar intake and avoid sweet foods today. Exercise priming made highly restrained eaters to have high intentions to limit sugar intake and avoid sweet foods today ( $M=3.39$ ,  $SD=2.06$ ),  $F(1,118)=8.18$ ,  $p < .01$ ) compared to lowly restrained eaters ( $M=3.06$ ,  $SD=1.75$ ). *Figure 9* shows this interaction effect.

*Table 6.* P values of behaviour intention items with median split of restrained eating style as independent variable

Behaviour intention items	P value Food exposure	P value Exercise priming
<i>Pre-consumption behaviour intention items</i>		
Likelihood of low-intensity physical activity today	.57	.57
Likelihood of low-intensity physical activity tomorrow	.85	.11
Likelihood of high-physical activity today	.06	.64
Likelihood of high-physical activity tomorrow	.09	.30
Likelihood of going to the gym and work-out today	.13	.67
Likelihood of going to the gym and work-out tomorrow	.54	.47
Likelihood of healthier meal choice today	.81	.12
Likelihood of healthier meal choice tomorrow	.69	.15
Likelihood of eating a lot of fruits and vegetables today	.93	.28
Likelihood of eating a lot of fruits and vegetables tomorrow	.74	.38
Likelihood of eating less today	.20	.81
Likelihood of eating less tomorrow	.31	.76
Likelihood of eating less snacks in between meals today	.69	.06
Likelihood of eating less snacks in between meals tomorrow	.83	.64
Likelihood of limiting sugar intake and avoid sweet foods today	.76	.01
Likelihood of limiting sugar intake and avoid sweet foods tomorrow	.95	.06
Likelihood of eating fast food like hamburgers, fries, pizza today	.25	.74
Likelihood of eating fast food like hamburgers, fries, pizza tomorrow	.89	.28
<i>Post-compensatory intention items</i>		
Eat pastries but eat less in the next meal	.26	.80
Eat pastries but consider it as next meal	.14	.36
Eat pastries but cut back later	.98	.74

Eat pastries but less tomorrow	.37	.53
Eat the pastries then engage to sports to make up for it	.84	.10

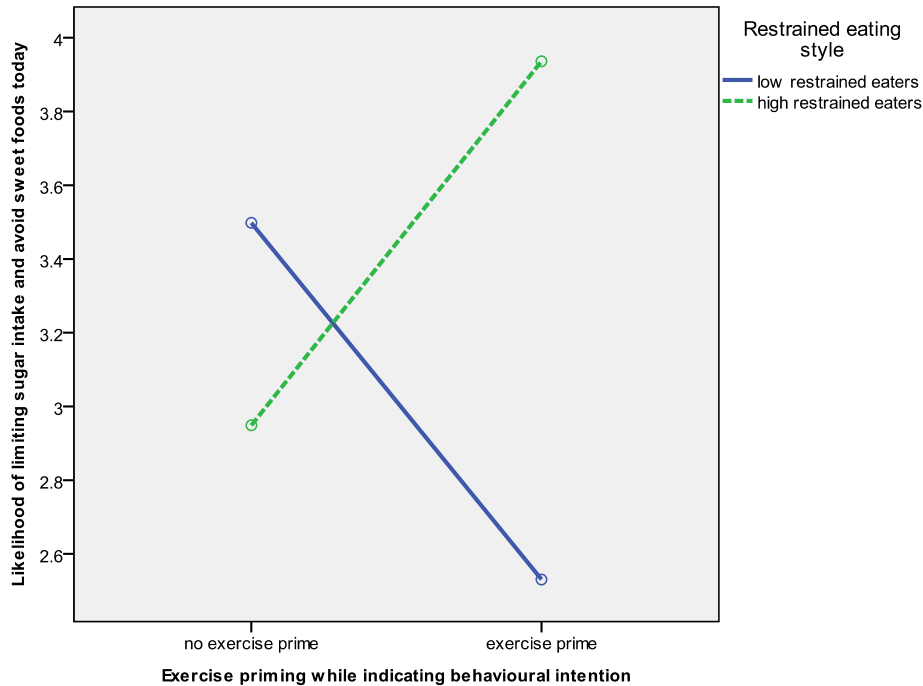
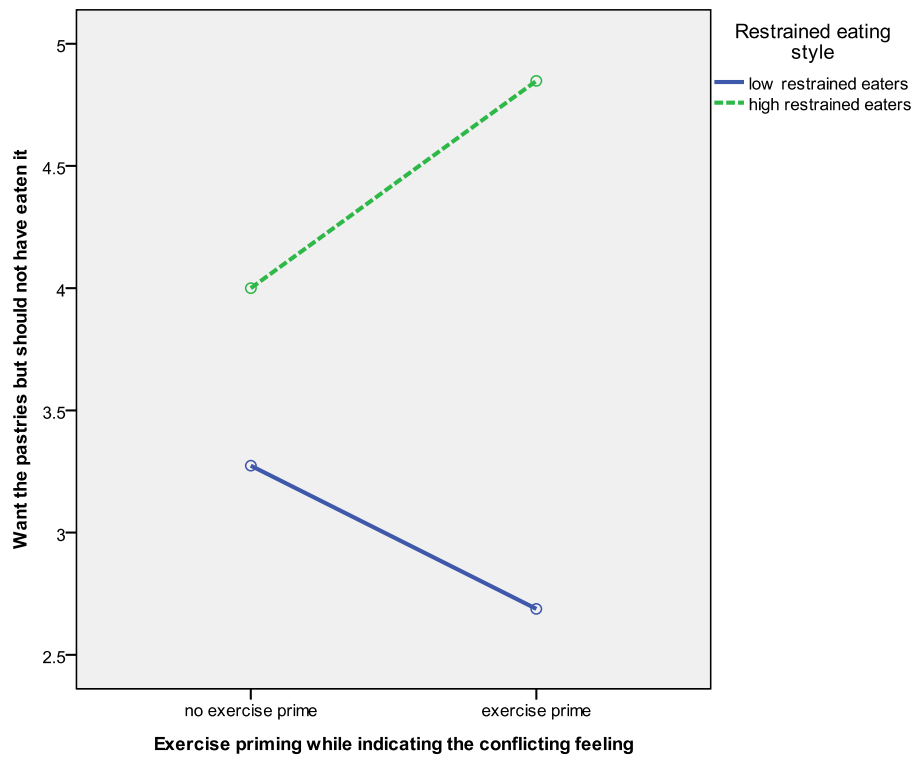


Figure 9 Mean likelihood of limiting sugar intake and avoid sweet foods today and exercise priming of low and high restrained eaters ( $p < .01$ )

The study analyzed for post-consumption motivational conflict items (See Table 7) and found a significance on conflicting feelings when confronted with food, the motivational conflict item was ‘want the cake but should not have eaten it’ on interaction of exercise priming and median split restrained eating. Highly restrained eaters in the exercise priming condition express high conflicting feelings that they want the pastries but should have not eaten it ( $M=4.34$ ,  $SD=1.82$ ),  $F(1,118)=4.81$ ,  $p < .03$ ) compared to lowly restrained eaters ( $M=3.02$ ,  $SD=1.73$ ). See Figure 10.

Table 7. P values of conflicting feelings when confronted with food

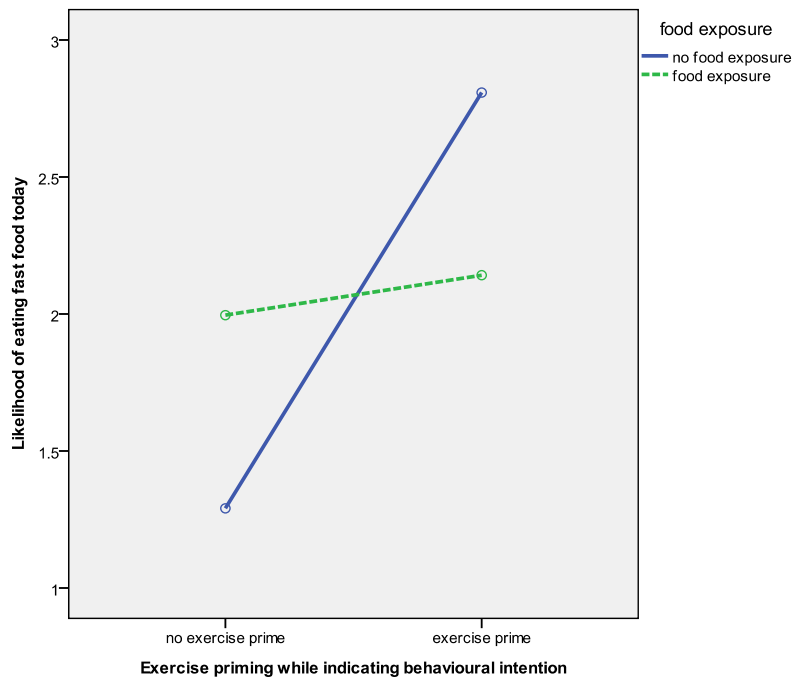
Post-consumption motivational conflict items	P value Food exposure	P value Exercise priming
Want the pastries but should have not eaten it	.67	.03
Felt guilty eating the pastries, but it looked delicious	.42	.74
Would not have eaten so much	.19	.16



*Figure 10* Mean likelihood of ‘want the cake but should not have eaten it’ and exercise priming of low and high restrained eaters ( $p < .03$ )

One three-way interaction was observed. That is, the likelihood of eating fast food like hamburgers, fries and pizza today was significant ( $p = .04$ ) on 3-way interaction of food exposure, exercise priming and median split restrained eating. See *Figure 11*.

### Low restrained eaters



### High restrained eaters

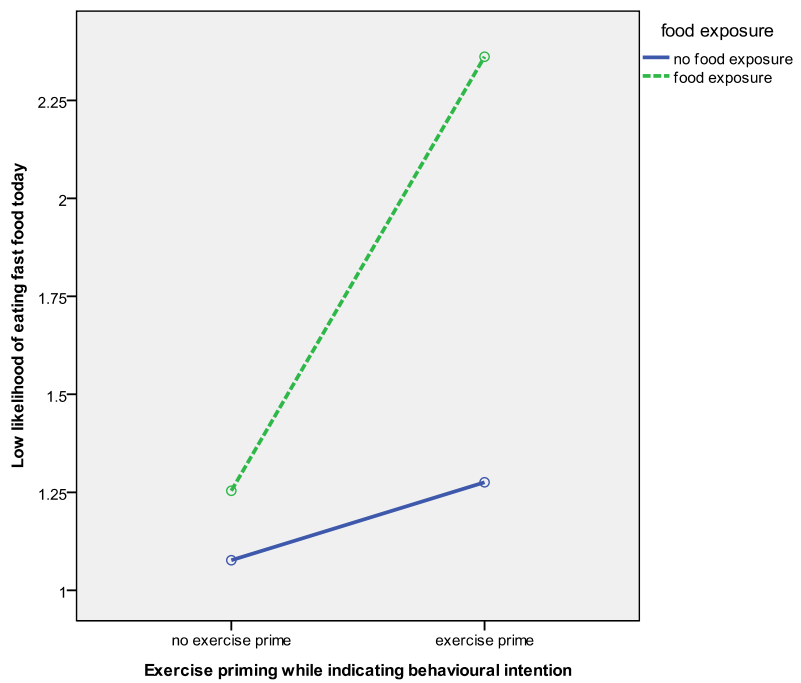


Figure 11 3-way interaction of food exposure, exercise priming and median split restrained eating ( $p < .04$ )



# 5 Discussion

## 5.1 The effect of food exposure and exercise priming on behavioural intentions

The present study examined the effect of food exposure and exercise priming on formation of compensatory intentions (e.g. intentions to engage in exercise, eat healthier or less after food indulgence). Based on Kronick and Knauper [15], the present study claimed that food exposure or temptations induces compensatory intentions. In other words, the study suggested that exposure to palatable food will trigger formation of higher compensatory intentions. In the study it was found out that that food exposure did not influence formation of compensatory behaviour intentions. This finding is inconsistent with the results of Kronick and Knauper that food temptations makes people form intentions to behaviourally compensate for indulgence. Unlike the previous experiment, the present study aimed to show the existence of compensatory intentions without relying on self-reported behaviours of participants. An explanation for the different findings can be attributed to the scheme of accounting for compensatory behaviour intentions, perhaps their self-reporting provided biased results. By mere asking people can motivate them to form behaviour or attitudes which were formerly not present [59]. This theory implies that by explicitly asking participants if they have compensatory intentions in mind can actually motivate their response towards the asked behaviour. Furthermore, the present study asserts the soundness of the implemented food temptation manipulation. Since the current research used exposure to palatable food versus no food exposure to manipulate temptation, as opposed to the previous study of Kronick and Knauper that used a mere attractive high-calorie cookie versus unappealing low-calorie cookie.

It is important to note that the present study does not claim that food temptations never lead to formation of compensatory behaviour intentions. The contribution of the research is on providing evidence that exposure to tempting foods can enhance behavioural intentions such as eating of relatively unhealthy fast food. The activation of this unhealthy intent can alert consumers of their subsequent behaviour. This notion is corroborated by previous experimental evidence that the exposure to attractive food instigates hedonic hunger [25, 60]. However, it is noteworthy to mention that current study observed that food exposure influences preference for fast food tomorrow but not today. It is unclear though why exposure to tempting foods did not lead to intentions to eat fast food today.

As expected, exercise priming significantly makes people dissatisfied of their own weight. Presence of home trainer and exercise posters evoked a reported greater dissatisfaction of one's weight. This finding is in accordance with empirical studies [31,32] that images of fit individuals alter one's judgement of ideal weight. The sporty and lean images being the standard of ideal

weight makes people dismayed with own body weight. Thus, the research contributes to the literature on fitness or slim cues in the environment causes body weight dissatisfaction.

An interesting result of the present study suggests that exercise primes could influence people's intentions to consume high-calorie food. Specifically, exercise priming prompted a high intention to eat fast food (e.g. pizza, hamburger & fries). Thus, rather than eliciting congruent intentions or activating long-term goals of dieting and weight prevention behaviours, the exercise prime seems to have counteracting effects and stimulate unhealthy behavioural intentions.

An explanation for the opposite goal activation may be related from experiment of Fishbach and colleagues [28] that through priming opposing goals can be activated. Nevertheless, in their study, fattening food primes was found out to activate the concept of diet, which is a highly valued goal. Thus, a specific study for counteracting effects of exercise priming goal activation on subsequent behavioural intentions is being proposed. There is also a probability that exercise primes makes people feel active and no longer feel the need to engage in fitness activities. Consequently, feeling of activeness brought by the exercise primes can increase preference of indulgent foods. This observation can be attributed to a theory called licensing effects [61] that prior attitude or behaviour affects the subsequent choice.

Overall, the study did not find an interaction between food exposure and exercise priming in the formation of compensatory intentions. However, the interaction of food exposure and exercise priming was significant for the following single items; likelihood to engage in high-intensity physical activity today and healthier meal choice tomorrow. Both compensatory behaviour intentions were significantly lower in the presence of food and fitness cues. The manipulation cues were thought to increase compensatory behaviour intentions. Instead, counteracting effects of goal priming were again observed.

On the other hand, the present study supports the discovery of Fedoroff and colleagues [25] that restrained eaters consume more when faced with food temptations. Considering that restrained eating score was found to be positively correlated with total calorie intake. Furthermore, highly restrained eaters form higher specific compensatory intention items. Since restrained eaters are more concerned of weight preventing behaviours it is possible that health goals are activated [13] on the presence of food temptations then resorting to follow the compensatory health belief.

## **5.2 Limitations**

It can be argued that the different findings of Kronick and Knauper's and the present study could also be attributed to the participants considered. The previous study included only female dieters as participants, whereas the present study included female students regardless of their dieting behaviours. As there are evidences that restrained eaters or chronic dieters are more responsive to food cues in the environment [25], compensatory behaviour intentions may have manifested better with strictly restrained eaters as participants. Moreover, the food items served were homogenous in terms of sweetness. Satiety to the pastries' sweet taste perhaps affected the participant's total calorie intake.

### **5.3 Suggestions for further research**

The findings of the study that exercise priming influences higher intentions to eat fast food (e.g. hamburgers, fries & pizza) can be of further research. It is probable that exercise primes elicits desire to eat specific high-calorie food. It could also be that goal activation from the fitness cues stimulates counter behavioural intentions. Further study should be directed on exercise priming's counter effect on activation of long-term health goals. Another proposed research from the present study is directed towards investigation whether only restrained eaters or dieters form compensatory intentions when confronted with indulgent foods.

### **5.4 Conclusion**

In conclusion, the present study demonstrates that exposure to high-calorie foods and exercise priming elicits behavioural intentions to consume fast food like hamburger, pizza and fries. People exposed to high-calorie pastries expressed higher intentions to eat fast food. Likewise, people manipulated with exercise primes expressed higher intentions to eat fast food. These findings may contribute to environmental cues that activate a desire to eat a specific type of food. The study contributes to the literature that exposure to slim body images leads to people's dissatisfaction of their own weight.

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## Appendix 1

### Self-esteem scale

Adapted from Heatherton & Polivy (1991)

1. I am pleased with my physical appearance
2. I feel dissatisfied of my own weight
3. I am terrible with food confrontation
4. I am satisfied with how my body looks
5. I feel somewhat guilty eating
6. I have high self esteem

### Mood scale

1. Sad to happy
2. Bad mood to good mood
3. Depressed to cheerful
4. Inactive to active
5. Weak to strong

### Self-control

Adapted from Ginger Sorella

1. I have self-control on food
2. I am experienced in controlling eating behaviour
3. I want to resist food temptations better
4. I frequently eat without thinking
5. I eat now and think about it later
6. I splurge sometimes

### Restrained eating score

Adapted from Polivy, Herman & Warsh

1. When I gained a little I will eat less
2. I try to eat less during meals
3. I frequently turn down food and drinks
4. I eat what is good for my weight
5. I am conscious what is eaten
6. If I eat more today I eat less the next day
7. I eat less not to gain weight
8. I try not to eat in between meals
9. I try not to eat in the evening
10. After eating I think whether I'm getting thinner or fatter

### **Impulsiveness**

Adapted from Barratt

*The following items describes me:*

1. Self-controlled
2. Extravagant
3. Farsighted
4. Responsible
5. Restrained
6. Easily tempered
7. Rational
8. Methodical
9. Enjoy spending
10. Planner

### **Exercise motivation scale**

Adapted from Li (1999)

1. I engage to sports to improve performance
2. Sports is fun
3. I do sports to stay healthy and fit
4. I engage to sports to lose weight
5. I am good in physical activity