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Is the healthy = tasty intuition affected by reactance?

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Foreword

The data collection of the present Master's Thesis has been conducted in collaboration with Claudia Prkna, who focused on the same topic and examined similar hypotheses in her Master's Thesis. Almost the same questionnaire was used, but different data sets were collected and they were analysed separately.

Acknowledgments

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Abstract

Researchers found out that consumers tend to prefer unhealthy food and rate it to be tastier than healthy food. This heuristic is referred to as the unhealthy = tasty intuition (UTI) (Raghunathan, Walker Naylor & Hoyer, 2006). However, another team of researchers found evidence for the opposite heuristic: Participants rated food products according to a healthy = tasty intuition (HTI), meaning that they associated health positively with taste (Werle, Trendel, Ardito, Mallard & Nat, 2013). These contrary results lead to the question, under which circumstances the positive relation between health and taste changes into the negative direction of an UTI. The aim of this study was to examine whether reactance affects the correlation between expected health and taste. Undergraduates of psychology were randomly assigned to the experimental condition (vs. control condition), in which a high-controlling health message (vs. a neutral message) was shown to induce reactance (e.g., Dillard & Shen, 2005). Afterwards, all participants judged the expected healthiness and tastiness of pictures of meals, which were labelled with one of three logos of different supermarket chains. These labels implicitly indicated the healthiness of the meal. I found a positive correlation between health and taste, but the reactance manipulation did not lead to the expected effect on this correlation.

Keywords: healthiness, tastiness, food preference, reactance, health messages, choice

Is the healthy = tasty intuition affected by reactance?

The global prevalence of overweight and obesity has massively increased over the past years, since 1975 it has almost tripled (WHO, 2018). According to the World Health Organisation (2018), 1.9 billion adults were overweight in 2016, even 381 million children and adolescents were overweight or obese. These changes are alarming since overweight and obesity can lead to serious health issues like psychological problems, diabetes, chronic inflammation, cancer, and cardiovascular diseases (Reilly et al., 2003; WHO, 2018). In Austria, cardiovascular diseases were even the leading cause of death in 2017 (Statistik Austria, 2018).

Decreased physical activity, partially due to changes in our environment, can be blamed for the increased prevalence of overweight and obesity as well as the related health issues (WHO, 2018). However, a key role in the occurrence of these diseases seems to play the nutritional behaviour of individuals (Pietrowsky, 2018). Fat and sugar as well as calories in general are consumed in large amounts, which often exceed the daily requirement (Rust, Hasenegger & König, 2017; United States Department of Agriculture, 2018). This can result in a weight gain to an unhealthy extent and in turn lead to above mentioned health consequences (WHO, 2018).

Many policy makers are trying to counteract this poor nutrition by spreading health messages with the help of advertisements and campaigns. The Fonds Gesundes Österreich (FGÖ), for example, presented a campaign regarding the prevention of cardiovascular diseases in the years 2008 and 2009. In three, slightly different thematic waves, they tried to motivate Austrians to eat healthier and to do more exercise by using posters and radio commercials (Fonds Gesundes Österreich, n.d.). At last, an event regarding this topic was organised for all Austrians, which is now hosted once every year.

According to Raghunathan, Walker Naylor and Hoyer (2006), people tend to prefer unhealthy food products over healthy ones, because they are unconsciously using a heuristic which is referred to as the unhealthy = tasty intuition. However, there are also contrary findings: Werle, Trendel, Ardito, Mallard and Nat (2013) found out, that people also rate the healthiness and tastiness of food according to a healthy = tasty intuition, meaning that they associate health positively with taste. These contrary results lead to the question, under which circumstances the positive correlation between health and taste is changed into a negative one, more precisely into an unhealthy = tasty intuition. With this study I examined whether reactance, induced by health messages, has a negative influence on the relation between health and taste.

The Unhealthy = Tasty Intuition

Why are previously mentioned health issues so common, even with many campaigns and projects promoting a healthy diet? As Raghunathan et al. showed with their experiments in 2006 in the United States of America, there seems to exist a heuristic, which is referred to as the unhealthy = tasty intuition (UTI). The participants' implicit belief in the relation of health and taste was measured with an IAT, revealing that they tended to associate tastiness stronger with unhealthy food items than with healthy food items. They found similar results, when the participants rated the tastiness and enjoyment of neutral food items, which were labelled to be either healthy or unhealthy: The participants rated unhealthy framed food items to be tastier than the healthy framed food items and they also claimed to enjoy unhealthy food more than healthy food. The UTI seemed to affect the participants' choice of crackers as well, whose alleged healthiness was manipulated by the experimenters. The participants selected unhealthy crackers more frequently than healthy ones.

The Healthy = Tasty Intuition

Interestingly, Werle, Trendel, Ardito, Mallard and Nat (2013) showed opposite results: People tend to prefer healthy food over unhealthy food. The researchers conducted two experiments with French undergraduate students. They let the participants go through an Implicit Association Test (IAT) in the first experiment, to detect their implicit opinion about the relation between health and taste. In contrast to the findings by Raghunathan et al. (2006), the participants implicitly associated healthy food products stronger with taste than unhealthy food products. They were also explicitly asked about their opinion about the relation between health and taste. Again, they explicitly stated that they do not find healthy food to be not tasty.

In the second experiment, the researchers examined whether the labelling of a neutral snack as healthy or unhealthy would influence its taste and the enjoyment of consuming it. They randomly assigned their participants to one of two groups, similar to the experiment by Raghunathan et al. (2006). In one group, the food item was described as being healthy, in the other group the same food item was described as being unhealthy. It turned out that the participants rated the healthy-labelled food item to be tastier than the unhealthy-labelled one and they also stated to enjoy it more than the unhealthy-labelled product. The researchers named this heuristic the healthy = tasty intuition (HTI).

Haasova and Florack (2019) detected similar results by letting their Austrian and German participants judge the healthiness and tastiness of a variety of different snacks and drinks. Again, the researchers revealed a general positive relation between healthiness and tastiness.

How is it possible to find completely divergent nutritional heuristics with almost the same experiments? When focussing on the differences between the experiments by Werle et al. (2013) and Raghunathan et al. (2006), it is noticeable that in one experiment of the latter,

they presented their participants a health message right before a task. In this health message, the researchers not only claimed that products containing more *good* fat would be healthier than those containing more *bad* fat, but also outlined the alleged health risks which would be the result of consuming too much of the so called *bad* fat. Afterwards, the participants rated the tastiness of three crackers, whose ingredient lists were manipulated by the experimenters, claiming to contain different amounts of different types of fat. This health message right before the task might be the crucial factor which turned the positive relation between health and taste into a negative one by evoking reactance in the participants.

Reactance

The theory of psychological reactance was first established by Brehm (1966). According to this theory, reactance is a motivational state, which occurs when a person is restricted in his or her freedom in decisions or behaviour. It is crucial that this person is aware of his or her freedom and that it is being restricted. The respective behaviour or decision also has to be important to the person. Within the state of reactance, the person then tries to restore the threatened freedom. The freedom can be restored either by subjectively lowering the desirability of the forbidden behaviour or alternative, or by actively acting against the restriction (Miron & Brehm, 2006).

In regard to afore-mentioned experiments by Raghunathan et al. (2006), the presented health message itself could have given the participants the feeling of being restricted in their freedom of choice, leading them to pick the allegedly unhealthy crackers in order to restore their freedom. This assumption is based on the results of different studies regarding the impact of health messages. Grandpre, Alvaro, Burgoon, Miller and Hall (2003), for example, implemented an anti-smoke campaign in elementary, middle and high schools. They presented the participants one of four messages: Either an implicit or explicit message, which was either pro- or anti-smoking. It turned out that high school students in the explicit

conditions reported to try a cigarette more likely. They also evaluated the messages more negatively than the participants in the implicit conditions did.

Scherschel Wagner, Howland and Mann (2015) examined the effect of implicit and explicit health messages as well. They set up three baskets with different snacks at the welcome desk at a conference. The participants, who attended the conference, were free to choose between an apple, candy bars and coffee beans. The candy bars and the coffee beans had neutral signs which remained the same, whereas the sign of the apples was changed every 20 minutes to one of three signs. The first sign, which was the neutral one, showed the Minnesota state seal and the text *Minnesota's state fruit*. The sign with the explicit health message showed the Minnesota state seal as well, but *a healthy choice* was written on it as well. The last sign with the implicit health message showed a picture of a red heart and a white check mark, a common label for healthy products, and again, *Minnesota's state fruit* was written on it. Again, the implicit health message was more successful than the explicit one: Significantly more participants picked an apple when they saw the sign with the implicit health message compared to the other two conditions.

Besides the explicitness of the health message, the phrasing seems to have an effect on the state of reactance as well. Dillard and Shen (2005) showed this with their study by presenting their participants a health message either regarding the risks of binge drinking or the risks of not flossing regularly. For each message, the researchers provided two versions: One high threat version, which was phrased in a very demanding, imperative way, and one low threat version, which suggested some useful practices in a more calm way. The participants of the high threat conditions felt a stronger threat to their freedom than those of the low threat conditions, and they experienced a stronger feeling of anger. Miller, Lane, Deatrick, Young and Potts (2007) detected similar results and found out that health messages with a high-controlling language, meaning an increased use of words like *must* and *should* as

well as a precise phrasing, were related to a stronger threat to freedom and a stronger feeling of anger than those with a low-controlling language.

About this Study

Since there are contrary findings about the relation of health and taste (Raghunathan et al., 2006; Werle et al., 2013), it is of interest, which factors lead to the change of the HTI. The aim of this study was to bring the research findings about the influence of health messages and threat to freedom together with those of the (un)healthy is tasty intuition. In this regard, my research question was: Is the HTI affected by reactance? This might be relevant for the sectors of education, politics, healthcare and others, who try to promote a healthy lifestyle in today's society by spreading health messages, like the afore-mentioned campaign by FGÖ (n.d.). These health messages could be evaluated in order to minimize the receiver's feeling of being restricted in her or his freedom. That way, the possibility of reactant behaviour like poor nutrition could be reduced, which in turn might decrease the risks of serious health issues.

As in the study by Haasova and Florack (2019), I let the participants rate the expected tastiness and healthiness of pictures of meals in order to assess the participants' belief in the relation between health and taste. Yet, in contrast to the experiments by Werle et al. (2013) and Raghunathan et al. (2006), who sometimes let their participants choose between single food products and entire meals, for example a single piece of broccoli and an entire pizza, I used pictures of complete meals for the healthy and unhealthy category, in order to make healthy and unhealthy foods more comparable.

Another difference to previous research is the implicit way of labelling of the pictures in this study, which should prevent reactant behaviour (Grandpre et al., 2003) and might also promote the choice of implicitly healthy labelled food products (Scherschel Wagner et al., 2015). Instead of explicitly pointing out which food is healthy and which is unhealthy, on

each picture I positioned the logo of a supermarket chain and a text, which informed the participant that the meal has been prepared with products of the respecting supermarket. In a pre-study, I examined two supermarket chains and I asked the participants, how they would perceive the supermarkets of interest compared to other supermarkets. As expected, Penny Markt, a discounter, was rated to be slightly unhealthier than the mean value and denn's Biomarkt, an organic supermarket, was judged significantly healthier than the mean value. Based on these findings, I used the Penny Markt logo in this study to make the meals appear unhealthy, and the denn's Biomarkt logo to make them appear healthy. I also added the logo of Merkur Markt, which is a standard supermarket, as a neutral label.

In line with the studies by Werle et al. (2013) and Haasova and Florack (2019), I expected an overall positive relation between expected healthiness ratings and tastiness ratings.

H1: The relationship between healthiness and tastiness judgments of meals will be generally a positive one.

As my research question already revealed, the factor of reactance played a key role in my study. At the beginning of my questionnaire, I asked the participants about their nutrition. To make the participants in the experimental group (vs. control group) feel threatened in their freedom of choice and thereby evoke reactance, I manipulated the response options (vs. no manipulation): For the question *Why don't you eat healthy?* the participants of the experimental group could not rate the presented statements with *I don't agree at all*, thereby forcing them to agree with each statement at least a little. Afterwards I showed them a demanding, imperative phrased (vs. neutral phrased) health message, which should lead to reactance as well (Dillard & Shen, 2005; Miller et al., 2007). I expected the participants of

the experimental group to restore their freedom by rating unhealthy food to be tastier than healthy food, meaning that the relation between health and taste will be changed into a negative direction.

H2: Reactance changes the relationship between healthiness and tastiness ratings negatively in the experimental group, compared to the control group.

I manipulated the perceived healthiness of the pictures of the meals by labelling them with the logo of one of three supermarket chains: Denn's Biomarkt (organic supermarket), Penny Markt (discounter) and Merkur Markt (standard supermarket). In line with the pre-test, I expected the following:

H3: Participants will rate meals with a denn's Biomarkt label to be healthier than meals with Penny Markt or Merkur Markt labels.

Again, I assumed that the participants will generally associate health positively with taste. Since the logo of denn's Biomarkt should indicate healthy meals and the logo of Penny Markt should function as a label for unhealthy food, I expected the following influence of the labels on the tastiness ratings:

H4: Participants will rate the tastiness to be higher when the meals are labelled with denn's Biomarkt than when they are labelled with Penny Markt or Merkur Markt.

I hypothesized that reactance changes the positive relation between health, indicated by the labels, and taste.

H5a: The participants in the experimental group will rate meals with denn's Biomarkt labels to be less tasty than the participants in the control group.

H5b: The participants in the experimental group will rate meals with Penny Markt and Merkur Markt labels to be tastier than the participants in the control group.

Raghunathan et al. (2006) addressed the behaviour of their participants in one of their experiments by letting them choose between several crackers with different amounts of *good* fat and *bad* fat. In my study, I also examined the choice of the participants: All participants had to select at least one out of 15 pictured meals, which they wanted to consume the most at the moment. I assumed that the participants will choose the meals in regard to a positive relation between health and taste, and that it will be affected by reactance.

H6a: The relation between the choice of the pictured meals and the expected healthiness ratings will be positive.

H6b: Participants will choose meals with denn's Biomarkt labels more frequently than meals with Merkur Markt or Penny Markt labels.

H7a: In the experimental condition, participants will choose unhealthy meals more often than in the control condition.

H7b: In the experimental condition, participants will choose meals with Penny Markt labels more often than meals with denn's Biomarkt or Merkur Markt labels, compared to the control condition.

Method

Participants

A total of 98 participants filled out the questionnaire and they all were recruited via the LABS system of the Faculty of Psychology. The topic of the study was described to be nutritional behaviour and nutritional attitude. The participants received two credits for their participation, which are necessary for the completion of some classes. The study was conducted in a laboratory setting with twelve computers, where twelve participants could complete the survey at the same time. However, in the most sessions there were only groups of about 6 to 10 students.

I created the questionnaire with the online survey tool Unipark and it took 15 minutes on average to fill it out. Participants who finished the questionnaire in under 10 minutes were excluded, since it indicated that they just clicked through it without reading the questions and tasks precisely enough. Also, those students who had technical problems and had to start the survey again were not included in the data analyses. Since there were two different conditions, with a new start of the questionnaire some of the participants were randomly assigned to the other group with slightly other questions and manipulations. According to G*POWER, a sample of at least 128 persons would have been necessary for a medium effect (d = 0.5, two-tailed test, error probability α = 0.05). After exclusion, a sample of 95 persons was left. All participants were undergraduates of psychology. They were between 19 and 34 years old (M_{age} = 22.39 years, SD_{age} = 3.19) and mainly female (71.6%). The sample was mainly German (51.6%) and Austrian (46.3%) with an average Body Mass Index of M_{bmi} = 21.5 (SD_{bmi} = 2.45), which lies within the normal range for adults.

Design

In the study, a 2 (induced reactance vs. neutral) x 3 (denn’s Biomarkt vs. Penny Markt vs. Merkur Markt) between-subjects design was employed. The participants were randomly

assigned to either the experimental group, where reactance was induced, or the control group without any manipulations. The dependent variables were the tastiness ratings of the meals, and the choice.

Manipulation

The manipulation in the experimental group consisted of two parts. In the beginning of the questionnaire they were asked about their nutritional behaviour, which was also the same for the control group. These questions were meant to give the participants the feeling that their personal behaviour is of interest for this study and not a hypothetical behaviour. After completing these questions, regardless of their answers, all participants of the experimental group were asked why they are not eating healthy. They had to rate several reasons (e.g., *because a healthy diet is too expensive for me*) on a 5-point Likert-scale from 1 = *I partly agree* to 5 = *I totally agree*, forcing them to agree to every reason for at least a little bit. The manipulated anchors together with the phrasing of the question was the first part of the manipulation and should threat the participant's freedom of choice, which should lead to reactance according to Miron and Brehm (2006). For the second part of the manipulation the experimental group then received the following health message:

> We strongly advise you to eat healthy and well-balanced!
>
> In the future, pay attention to the following aspects:
>
> - at least 400g fruits and vegetables per day
> - less than 50g sugar per day
> - less than 5g salt per day

The mentioned quantities of the food products were taken from the current dietary guidelines of the WHO (2018). The message addressed the participants of the experimental condition directly and it was phrased in an imperative and demanding way, which also should evoke reactance (e.g. Dillard & Shen, 2005; Miller et al., 2007).

Stimuli

For the healthiness and tastiness judgments, as well as the choice, pictures of meals were presented to each participant of both conditions. I took 168 pictures from GMS Gourmet GmbH, a producer of convenience food, and they included a variety of healthy and unhealthy meals, different cuisines, and they contained salads, soups, main dishes and desserts. With the pictures of the entire meals I made sure that the healthy and unhealthy foods are more comparable. All pictures had the same neutral look, where the meals were presented on a white plate in front of a white background.

Labels

The results of my pre-test revealed, that the participants perceived denn's Biomarkt, an organic supermarket, as healthier than other supermarkets and Penny Markt, a discounter, as unhealthier than other ones. Because of these results, I positioned one of three supermarket logos on each meal. For each meal, I therefore designed three versions with an image editing program: One time labelled with the denn's Biomarkt logo, one time with the Penny Markt label, and one time with the Merkur Markt label. I chose Merkur Markt, a standard supermarket, as the neutral label. On each label I additionally put a text, which stated that the depicted meal has been prepared with products of the respective supermarket. Figure 1 shows examples of the used pictures. Because of the three versions of each meal, a total pool of 504 pictures was formed. For each participant, 15 pictures were randomly drawn from the pool.

Procedure

I conducted the survey at the computer laboratory at the Neues Institutsgebäude (NIG) of University of Vienna. Each participant signed the informed consent in the beginning and then moved on to the questionnaire. The questionnaire-related instructions were part of the questionnaire. The participants were randomly assigned to either the control or the experimental condition. In both groups they first had to answer questions about their

Figure 1. Sample pictures of one meal, each with one of three supermarket labels

nutritional behaviour (e.g., *Sometimes I eat small snacks between the meals.*) on a 5-point Likert-scale with 1 = *I don't agree at all* and 5 = *I completely agree*. This set of questions was a mixture of self-invented questions and questions of the questionnaire on nutrition in the last 12 months (Helmholtz Zentrum München, n.d.) and of the scales for recording nutritional attitudes and decisions (Kals & Odenthal, 1996).

In the experimental group, the participants then were asked why they do not eat healthy, in the control group they were asked what they think are the reasons, that some people do not eat healthier. All participants then received a health message, suggesting specific nutritional guidelines. This was followed by the rating tasks. Each participant of both conditions had to rate 15 pictures of meals two times in two consecutive blocks. In the first block, the participants had to judge the healthiness of the meals on a 10-point response scale ranging from -5 = *not healthy at all* to +5 = *very healthy*. In the second one, they had to rate the tastiness of the meals on a 10-point response scale ranging from 1 = *not tasty at all* to 10 = *very tasty*. This rating system is based on the study by Haasova und Florack (2019). The order of the blocks was randomised as well as the pictures themselves. To assess the choice of the participants, I presented them all 15 meals on one site again and they had to select at least one meal that they wanted to consume right now.

Afterwards, I assessed the mood of the participants of both groups and inquired some moderating variables such as trait reactance. At the end of the questionnaire, I asked them a few questions about the mentioned supermarket chains, and assessed demographic variables such as dietary practices, weight, height, age and gender. Finally, the participants had the possibility to leave feedback. After completing the survey, I thanked and dismissed them. Figure 2 shows an overview of the procedure. A more detailed overview of the full questionnaire is presented in Appendix B.

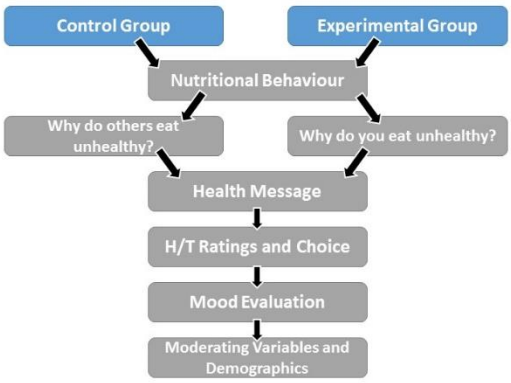


Figure 2. Overview of the procedure

Measures

Mood evaluation and reactance measure. As in the study of Dillard and Shen (2005), I used the anger scale as manipulation check as part of the mood evaluation in both conditions. Yet, in this study I only used two of the originally four items of the scale. I asked the participants how much of the feeling *irritated* and *annoyed* they were experiencing at the moment and they had to rate it from 1 = *none of this feeling* to 5 = *very much of this feeling*. I generated a low Cronbach's α value of .64 for this scale. Just like in the study by Dillard and Shen (2005), I expected that the reported anger would give an indication about the reactance in the participants.

Additionally, I used the two items *pleasant* and *happy* of the six positive items of the SPANE from Li, Bai and Wang (2013) in order to receive additional information about the

participants' emotional state. The answer pattern was the same as for the negative items. This scale resulted in a Cronbach's α value of .76.

Moderating variables. I measured three variables in order to examine their possible influence on the outcome in the data analysis later on. The used items and the Cronbach's α values of the scales are presented in Appendix A (see Table A1). First of all, I measured the trait reactance of the participants of both conditions by using a selection of the items of Hong's Psychological Reactance Scale (Hong & Page, 1989). The participants had to rate the statements (e.g., *I consider advice from others to be an intrusion*) on a 5-point Likert-scale ranging from 1 = *not at all* to 5 = *absolutely* (α = .71).

I also took the general health interest (GHI) of the participants into account, with the 7-point response scale (1 = *strongly disagree*, 7 = *strongly agree*), a subscale of the Health and Taste Scales from Roininen, Lähteenmäki and Tuorila (1999), like Haasova and Florack (2019) did in their study. Again, the participants had to state their agreement with the statements like *It is important for me that my diet is low in fat*. The scale obtained a Cronbach's α value of .82.

Lastly, in line with the study by Raghunathan et al. (2006), I surveyed the explicitness of belief in the UTI with the same two items they already had used (α = .65). The participants had to judge the two items (e.g., *Things that are good for me rarely taste good*) on a 9-point response scale (1 = *strongly disagree* and 9 = *strongly agree*).

Data Analysis

For the data analysis I used the software IBM SPSS statistics (Version 21). To analyse the difference in reactance between both conditions, I computed a *t*-test for independent samples. To account for the repeated measurements, since each meal was rated sequentially, and the different conceptions of healthiness and tastiness within the participants, I computed

linear mixed models (LMM) for the investigation of my hypotheses and I also included intercepts. I set a significance level of $\alpha = .05$ for all analyses.

Results

Manipulation Check

In order to assess the reactance I compared the extent of the negative emotions from the anger scale (Dillard & Shen, 2005) between experimental group and control group. I expected the participants in the experimental condition to state a higher extent of negative emotions than the participants in the control condition. I used a *t*-test for independent samples. I chose the conditions (induced reactance vs. neutral) as independent variable and the anger scale as dependent variable. Against my hypothesis, the analysis revealed no significant difference between both conditions in anger ($t(93) = .155$, $p = .88$).

Labels and Expected Healthiness Ratings

The pre-test already confirmed my assumption that denn's Biomarkt would be rated healthier than other supermarket chains and Penny Markt unhealthier than others. First of all, I checked if the ratings of expected healthiness of the participants were related to the supermarket labels in the present study as well. For this purpose I conducted two linear mixed models. In the first one, I only included Penny Markt labels and denn's Biomarkt labels, in the second one, I computed the analysis with only Merkur Markt labels and denn's Biomarkt labels. Throughout both analyses, I set the expected healthiness ratings as the dependent variable, conditions and labels as the predictors and the maximum likelihood for parameter estimation. The first analysis, with only denn's Biomarkt and Penny Markt labels included, revealed a main effect of the labels ($F(1,918) = 24.09$, $p < .001$) throughout both conditions (induced reactance vs. neutral), indicating that the healthiness ratings were affected by the label itself, regardless of the supermarket. I also found a significant positive relation between denn's Biomarkt label and expected healthiness ratings ($b = .69$ ($SE = .21$), $t(921) = 3.27$, $p =$

.001) in comparison with the Penny Markt labels, indicating that meals with a denn's Biomarkt label were rated to be significantly healthier compared to those with a Penny Markt label. However, the second analysis, where I included only Merkur Markt labels and denn's Biomarkt labels, indicated that denn's Biomarkt labels were not significantly stronger related to healthiness than Merkur Markt labels (b = .27 (SE = .21), $t(928) = 1.3$, p = .19). However, the results of the second analysis revealed again a main effect of the labels throughout both conditions ($F(1,925) = 5.58$, p = .02).

For both analyses, the parameter estimates of the effects of labels and conditions (induced reactance vs. neutral) on the expected healthiness are shown in Table 1. As

Table 1

Parameter estimates of the effects of selected labels and conditions (reactance vs. neutral) on expected healthiness ratings, using LMM

	Analysis 1: Penny & denn's labels		Analysis 2: Denn's & Merkur labels	
Parameter	*F*	*b*	*F*	*b*
Fixed effects				
Intercept	4.77		5.19	
Labels	24.09***	.69** (.21)	5.58*	.27 (.21)
Conditions	.33	.07 (.25)	.16	.01 (.25)
Labels x Conditions	.09	.09 (.3)	.27	.15 (.29)

Note. $^{+}$ = p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the expected healthiness ratings of meals. The labels variable is coded as 1 = denn's, 2 = Penny and 3 = Merkur. The conditions variable is coded as 1 = induced reactance and 2 = neutral. Standard errors are shown in parentheses.

hypothesized, meals with a denn's Biomarkt label were generally rated to be healthier than those with a Penny Markt label (M_{denns} = 5.52 (SD_{denns} = 2.34), M_{penny} = 4.79 (SD_{penny} = 2.37)).

Yet, there was no significant difference in expected healthiness between meals with denn's Biomarkt labels and meals with Merkur Markt labels (M_{merkur} = 5.22 (SD_{merkur} = 2.29)).

Labels and the Healthy = Tasty Intuition

I expected a general positive relation between health and taste, with the labels indicating the healthiness of the meals. Meals labelled with denn's Biomarkt logo, which indicated high healthiness, should therefore be rated to be tastier than meals with Penny Markt or Merkur Markt labels. To test this assumption I computed two analyses with LMM, with expected tastiness ratings as dependent variable, and conditions (induced reactance vs. neutral) and labels, as well as their interactions as fixed factors. Again, I selected maximum likelihood for estimation.

First, I compared the judged tastiness of meals labelled with denn's Biomarkt with the tastiness of those labelled with Merkur Markt. I found a main effect of label (F(1,906) = 8.26, p = .004), the expected tastiness ratings therefore seem to be affected by the label itself, regardless of the supermarket. Furthermore, the analysis revealed that the participants expected the tastiness of food with denn's Biomarkt labels to be slightly higher than food with Merkur Markt labels, which I chose as the neutral label, but the difference was not significant (b = .43 (SE = .24), t(909) = 1.80, p = .07).

Afterwards I compared the expected tastiness of meals with denn's Biomarkt and Penny Markt labels. The analysis revealed, that the expected tastiness of meals with a denn's Biomarkt label was rated significantly higher than with a Penny Markt label (b = .66 (SE = .24), t(896) = 2.76, p = .006). Again, the results of the second analysis showed a main effect of label on expected tastiness ratings (F(1,894) = 22.57, p < .001). The results of both analyses are presented in Table 2.

Table 2

Parameter estimates of the effects of selected labels and conditions (reactance vs. neutral) on expected tastiness ratings, using LMM

	Analysis 1: Denn‘s & Merkur labels		Analysis 2: Denn’s & Penny labels	
Parameter	*F*	*b*	*F*	*b*
Fixed effects				
Intercept	5.54		5.29	
Labels	8.26**	.43^{+} (.24)	22.57***	.66** (.24)
Conditions	.61	-.28 (.33)	1.04	-.45 (.34)
Labels x Conditions	.11	.11 (.34)	.73	.29 (.34)

Note. $^{+}$ = p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the expected healthiness ratings of meals. The labels variable is coded as 1 = denn’s, 2 = Penny and 3 = Merkur. The conditions variable is coded as 1 = induced reactance and 2 = neutral. Standard errors are shown in parentheses.

These results confirmed my hypothesis, that meals with denn’s Biomarkt labels would be rated the tastiest in general, partially: Since meals with denn’s Biomarkt labels were rated to be significantly healthier than those with Penny Markt labels (M_{denns} = 5.88 (SD_{denns} = 2.79), M_{penny} = 5.08 (SD_{penny} = 2.78)), the results indicate a significant positive relation between health and taste, when the healthiness is signified by the labels. This relation was not significant for the comparison between meals with denn’s Biomarkt labels and meals with Merkur Markt (M_{merkur} = 5.39 (SD_{merkur} = 2.77)). Figure 3 shows the mean values and standard deviations of the tastiness of meals, separated by labels.

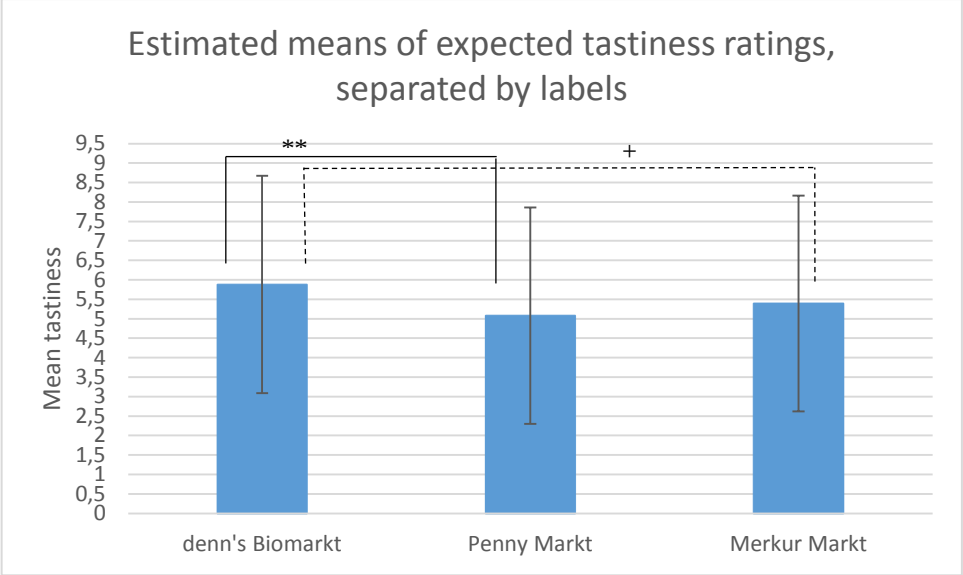


Figure 3. Mean values and standard deviations of expected tastiness of the meals, separated by labels. $^{+}$= p <. 10, * = p < .05, ** = p < .01, *** = p < .001.

Moderating effect of reactance. I further hypothesized that the induced reactance in the experimental group would affect the positive relation between health and taste, compared to the control group. Meals with denn's Biomarkt labels, which signal higher healthiness than Penny Markt or Merkur Markt, should therefore be rated untastier in the experimental group than in the control group. I also hypothesized that meals with Penny Markt or Merkur Markt labels will be rated to be tastier in the experimental group than in the control group. The results revealed no significant differences in tastiness ratings, regardless of label or condition (induced reactance vs. neutral). The parameter estimates of the effects of labels and conditions on the expected tastiness are shown in Table 2 as well. Against my hypothesis, the induced reactance had no effect on the relation between health (indicated by the labels) and taste. The descriptive statistics are shown in Table 3.

Table 3

Descriptive statistics for expected tastiness ratings of meals, separated by labels and conditions (induced reactance vs. neutral)

	Induced reactance			Neutral condition		
Label	*n*	*M*	*SD*	*n*	*M*	*SD*
Denn's Biomarkt	237	5.78	2.84	234	5.98	2.74
Penny Markt	230	4.87	2.83	242	5.29	2.72
Merkur Markt	238	5.26	2.79	244	5.52	2.75

The Healthy = Tasty Intuition

In line with the findings by Werle et al. (2013) and Haasova and Florack (2019), I predicted a general positive relation between health and taste. To test this assumption, I computed a LLM with expected tastiness ratings as the dependent variable, expected healthiness ratings, which is a continuous variable, as covariate and conditions (induced reactance vs. neutral) as predictor. For parameter estimation I selected maximum likelihood. As predicted, the analysis revealed a significant positive correlation between expected healthiness ratings and expected tastiness ratings (b = .3 (SE = .04), $t(1412) = 7.47$, $p < .001$), indicating that the participants associated expected health positively with expected taste.

Moderating effect of reactance. I predicted, that this overall positive relation between health and taste would be affected by reactance and turned into the direction of an UTI. However, the analysis revealed no significant effect of the interaction of conditions (induced reactance vs. neutral) and healthiness ratings on the expected tastiness ratings ($F(1,1405) = .61$, $p = .44$). All parameter estimates of the effect of the condition (induced reactance vs. neutral) on expected tastiness ratings are shown in Table 4.

Table 4

Parameter estimates of the effect of conditions (reactance vs. neutral) on expected tastiness ratings, using LMM

Parameter		*F*	*b*
Fixed effects			
Intercept	4.04		
Conditions		1.86	-.55 (.4)
Healthy Rating		124.63***	.3*** (.04)
Healthy Rating x Conditions		.61	.05 (.06)

Note. $^{+}$ = p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the expected tastiness ratings of meals, with expected healthiness ratings as covariate. The conditions variable is coded as 1 = induced reactance and 2 = neutral. Standard errors are shown in parentheses.

Covariates. The relation between expected health and taste perhaps is influenced by other variables (for parameter estimates of the following analyses, see Appendix A: Table A2, A3 and A4). I received some feedback of participants, who reported that they were vegan or vegetarian and therefore could not rate the pictures of meals with meat or other products, which they do not consume, properly. For this purpose I computed the same LMM again as I did above, but I excluded all participants who reported to be vegan or vegetarian. As it turned out, there still was a positive relation between healthiness and tastiness ratings (F(1,1332) = 122.82, p < .001), but no significant effect on the tastiness ratings by reactance (F(1,392) = 1.0, p = .32). The reactance had no significant effect on the tastiness ratings either, when I excluded all participants, who reported that they don't know at least one of the mentioned supermarkets (F(1,308) = 2.46, p = .12), since the knowledge of the different supermarkets could have also been crucial for the tastiness ratings. However, I still found a positive relation between health and taste (F(1,1054) = 100.92, p < .001).

In regard to the moderating effect of GHI on the relation between health and taste detected by previous research (Haasova & Florack, 2019), I assessed this variable as well. It could be argued that individuals who pay a lot attention to their health have a healthier lifestyle, eat healthier, and therefore might rate healthy meals to be tastier than individuals who do not take care of their health. Furthermore, the individual differences of the participants in trait reactance could also have an impact on the correlation between health and taste. To test this assumption, I computed a LMM with tastiness ratings as the dependent variable, conditions as predictor and general health interest, trait reactance, as well as expected healthiness ratings, which is a continuous variable, as covariates. For estimates, I selected maximum likelihood estimation. The results revealed no effect on the tastiness ratings, neither with general health interest as covariate ($F(1,1396) = 3.43$, $p = .06$), which was almost significant, nor with trait reactance as covariate ($F(1,1405) = .22$, $p = .64$).

Choice

Finally, I hypothesized that there is a general positive relation between expected healthiness ratings and choice, and that this relation is affected by the induced reactance. As part of the survey, each participant had to choose at least one out of 15 pictures of meals. For the data analysis I then coded the pictures with 0 = *not selected* and 1 = *selected*. I computed a linear mixed model, with choice as dependent variable, conditions (induced reactance vs. neutral) as predictor, expected healthiness ratings (a continuous variable) as covariate and maximum likelihood estimation for parameter estimates. As predicted, the analysis revealed a general positive relation between expected healthiness and choice ($b = .04$ ($SE = .01$), $t(1294) = 6.6$, $p < .001$), but, against my hypothesis, this relation was not affected by reactance ($F(1,1350) = .25$, $p = .62$). For more detailed results, see Table 5.

Table 5

Parameter estimates of the effect of conditions (reactance vs. neutral) on choice, using LMM

Parameter		*F*	*b*
Fixed effects			
Intercept	.04		
Conditions		.1	.02
			(.06)
Healthy Rating		73.96***	.04***
			(.01)
Healthy Rating x Conditions		.25	-.005
			(.01)

Note. $^{+}$ = p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the choice of meals, with expected healthy ratings as covariate. The conditions variable is coded as 1 = induced reactance and 2 = neutral. The choice variable is coded as 0 = not selected and 1 = selected. Standard errors are shown in parentheses.

I also expected a general positive relation between choice and health in regard to the labels, meaning that meals with denn's Biomarkt labels should be chosen more frequently than meals with other labels. Furthermore, I hypothesized that this positive relation is reduced by reactance. Meals with Penny Markt labels should therefore be chosen more frequently than meals with other labels in the experimental condition, compared to the control condition. I computed two linear mixed models again, by including only denn's Biomarkt and Penny Markt labels for the first one, and for the second one, I only included denn's Biomarkt and Merkur Markt labels. For both analyses, I added labels to the predictors. Against my hypotheses, both analyses revealed no significant differences in labels (F(1,943) = .08, p = .77; F(1,952) = .65, p = .42), indicating that the participants did not choose the meals based on their labels. Furthermore, the relation between choice and expected healthiness (indicated by labels) was not affected by reactance (F(1,943) = .23, p = .63; F(1,952) = .18, p = .68). The parameter estimates of the analyses are shown in Table 6.

Table 6

Parameter estimates of the effects of selected labels and conditions (reactance vs. neutral) on choice, using LMM

	Analysis 1: Penny & denn's labels		Analysis 2: Denn's & Merkur labels	
Parameter	*F*	*b*	*F*	*b*
Fixed effects				
Intercept	.08		-.03	
Labels	.35	-.01 (.09)	2.5	.09 (.1)
Conditions	.15	-.03 (.09)	.71	.04 (.1)
Labels x Conditions	.64	.11 (.14)	.09	.04 (.14)
Healthy Rating	36.38***	.04** (.01)	50.13***	.05*** (.01)
Healthy Rating x Conditions	.52	-.003 (.02)	.62	-.004 (.02)
Healthy Rating x Labels	.08	.01 (.02)	.65	-.005 (.02)
Healthy Rating x Labels x Conditions	.23	-.01 (.02)	.18	-.01 (.02)

Note. $^{+}$ = p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the choice of meals, with expected healthy ratings as covariate. The labels variable is coded as 1 = denn's, 2 = Penny and 3 = Merkur. The conditions variable is coded as 1 = induced reactance and 2 = neutral. The choice variable is coded as 0 = not selected and 1 = selected. Standard errors are shown in parentheses.

Discussion

Despite the heuristic, that healthy food is tastier than unhealthy food (Werle et al., 2013; Haasova & Florack, 2019), overweight and its health consequences are very common in today's society (Reilly et al., 2003; WHO, 2018). With this study I examined whether reactance is responsible for this phenomenon and leads consumers to choose unhealthy food products over healthy ones. I let participants rate the expected healthiness and tastiness of

pictures of meals. I manipulated the healthiness of the pictured meals by adding one of three different supermarket logos.

In line with previous research (Werle et al., 2013; Haasova & Florack, 2019), I found an overall positive relation between expected health and taste. However, against my hypothesis, this relation was not affected by induced reactance.

Relation between Health and Taste

Raghunathan et al. (2006) found evidence that there exists an unhealthy = tasty intuition, meaning that individuals prefer unhealthy food and rate it to be tastier than healthy food. These findings are contradicting with those by Werle et al. (2013). In line with their results, I assumed that the relation between health and taste is predominantly a positive one, but specific circumstances can change it into a negative direction. In order to investigate this assumption, I used the rating system from Haasova and Florack (2019): I let all participants judge the expected healthiness and tastiness of 15 pictures of meals. For each participant, the pictures were randomly selected from a very large pool of 165 pictures, including meals of different cuisines, which naturally varied in healthiness and thereby promoted the feeling of a real-life choice and rating situation. In contrast to previous studies (Raghunathan et al., 2006; Werle et al., 2013), where participants often had to choose between an entire unhealthy meal and a single healthy food product (for example between a whole pizza and a single piece of broccoli), I selected pictures of entire meals for both the unhealthy and the healthy category, to ensure a better comparison. Another advantage of my study was the identical design of the pictures: All meals were presented in the same neutral way, with the food presented on a white plate with a white background.

As I expected, the analysis revealed an overall significant positive relation between health and taste. These findings are in line with the results of previous studies (Werle et al., 2013; Haasova & Florack, 2019) and strengthen the assumption that people generally tend to

have a positive association of health and taste, since this seems to be true not only for single food products, but also for entire meals, as it was shown in the present study. Similar to Raghunathan et al. (2006), I also assessed the behaviour of the participants by letting them select at least one of the 15 presented meals, which they wanted to consume the most at the moment. In regard to the HTI, I hypothesized that the participants will generally choose healthy meals more often than unhealthy meals, since they should find them to be particularly tasty. The results of the analysis confirmed this hypothesis and thereby contradict the findings by Raghunathan et al. (2006), whose participants selected unhealthy food products over healthy ones.

Supermarket Labels

Another difference to previous studies (Werle et al., 2013; Raghunathan et al., 2006) is the implicit health labelling of the meals: Instead of explicitly telling participants which meals are considered healthy or unhealthy, I manipulated the pictures by labelling them with one of three different supermarket logos and a note, which stated that the meal has been prepared with products of the respective supermarket chain. Brands are often attributed with healthiness or unhealthiness, which in turn can have an impact on the expected healthiness of the products and the purchase intention of the consumers (Choi & Reid, 2018). In order to manipulate the pictures and categorize them into healthy and unhealthy, I needed a supermarket chain associated to healthiness and one associated to unhealthiness. In regard to the results of my pre-test, I selected denn’s Biomarkt as the healthy supermarket and Penny Markt as the unhealthy one. I also added Merkur Markt as a neutral label. Transferring the assumption of a general positive relation between health and taste to the supermarket labels, as expected, meals with denn’s Biomarkt labels were significantly chosen more often and rated to be tastier than meals with Penny Markt labels. These results seem to confirm that brands, supermarket chains in my case, are associated with different degrees of healthiness

(Choi & Reid, 2018) and in this regard also with different degrees of tastiness. Furthermore, I found a main effect of the labels on expected tastiness ratings and on expected healthiness ratings, indicating that the label itself, regardless of the supermarket chain, affected the expected health and taste of the meals. The presentation of a brand might have been interpreted as advertisement by the participants and lead them to a reaction.

Reactance

I assumed that the general positive relation between health and taste sometimes is reduced or even changed into the negative correlation, which Raghunathan et al. (2006) have observed. In my study, I tested whether reactance leads consumers to prefer unhealthy food over healthy food. This assumption is based on the experimental differences in previous research: Raghunathan et al. (2006), in contrast to Werle et al. (2013), showed their participants a health message. According to several studies (e.g., Grandpre et al., 2003), health messages can give individuals the feeling of being restricted in their freedom and lead them to restore that freedom through reactant behaviour, for example by acting against the advices of the health message (Miron & Brehm, 2006). Since the use of explicit health labels might lead to reactant behaviour as well (Scherschel Wagner et al., 2015), I used the supermarket labels in order to implicitly indicate healthiness and to prevent any reactance in the control group.

In order to induce reactance in the experimental group, I showed them an explicitly (Grandpre et al., 2003; Scherschel Wagner et al., 2015) and highly demanding phrased (Dillard & Shen, 2005; Miller et al., 2007) health message (vs. a neutral health message in the control group). As manipulation check I used the anger scale by Dillard and Shen (2005), who suggested a positive correlation between anger and reactance. I therefore expected the experimental group to claim to have stronger negative emotions than the control group, but this was not the case. Furthermore, I assumed that the participants of the experimental group

would rate the expected tastiness higher for healthy meals (and meals with denn's Biomarkt labels) than for unhealthy meals (and meals with Merkur Markt or Penny Markt logo) compared to the control group as part of their reactant behaviour, which should restore their restricted freedom (Miron & Brehm, 2006). Since the manipulation check indicated no reactance in the experimental group, there was no effect of reactance on expected tastiness ratings either. The choice of the participants also was not affected by reactance. This might be due to the subtle reactance manipulation.

Limitations and Future Research

In line with previous research (Haasova & Florack, 2019; Werle et al., 2013), the present study revealed a general positive relation between health and taste, which could even be transferred to the context of entire meals and supermarket labels with different degrees of health associations. However, there is no evidence that the participants rated and chose the pictured meals according to a HTI, which states that the taste is determined by the perceived healthiness of the food product or brand. It is possible that the participants judged the food (and brands) according to other factors as well and not necessarily took the perceived healthiness as the only source of information for the expected tastiness. Future studies should investigate this issue, perhaps by using an IAT, like previous research did (Raghunathan et al., 2006; Werle et al., 2013).

The main assumption of my study, which was the negative influence of reactance on the positive relation between health and taste, could not be confirmed in any case. One reason for these results might be the subtle manipulation. Considering the experiments by Dillard & Shen (2005), the phrasing of the health message in the experimental condition might not have been determining enough and it might have been too short in general. Also the subtle manipulation of the response scale might not have been recognised by all participants. I assume that not everybody read the anchors of the response scale to the question, why they

do not eat healthy, consciously, since in most surveys the leftmost anchor stands for total disagreement. At least some of the participants therefore might have automatically chosen the leftmost response, without noticing that in this case the leftmost answer implied that they agreed a little bit to the presented statements. Without noticing that their freedom of choice has been restricted, they had no reason to restore that freedom with reactant behaviour (Miron & Brehm, 2006). A stronger and more obvious restriction of freedom might have led to a stronger reactance. The manipulation check might have not captured the reactance properly as well. I only used the anger scale by Dillard and Shen (2005) and only selected two of the four items. More and different reactance measures would certainly give better insight of how well the manipulations have worked.

Another limitation of my study might be the setup of the experiment. In contrast to the studies by Werle et al. (2013) and Raghunathan et al. (2006), I did not provide real food. The participants in my study only judged the expected healthiness and tastiness of pictures of meals, knowing that they will not receive any of the pictured food. The tastiness and healthiness ratings as well as the choice of the participants might have been different if they would have judged real meals.

The pictures of the meals I had selected represented a variety of different cuisines and consisted of starters, soups, main dishes and desserts. Some participants stated that they were not able to judge some of the presented meals properly, since they do not eat meat, fish or any other food products of animal origin. In my analyses I took account of vegans and vegetarians, but there are a lot of other different diets that might have had an influence on choice as well as the expected tastiness and healthiness judgements. Future research should take this into consideration.

Unfortunately, the sample size of 95 persons was very small, since at least 128 would have been necessary for a medium effect, according to power-test with G*POWER. In

addition, all participants had demographic similarities: They all were undergraduate students of psychology and from the same age group, ranging between 19 and 34 years. Most of them were Austrians or Germans, only a small part had a different nationality. Future research should therefore not only select a larger sample, but also one that represents the population in a better way.

Relevance

Lack of physical activity and poor nutrition seem to be strongly associated to a lot of dangerous health issues (Pietrowsky, 2018; WHO, 2018). With this study I wanted to contribute to prevention of those nutrition related diseases by bringing the past results of the influence of health messages and threat of freedom together with those of the (un)healthy is tasty intuition. A lot of initiatives are also trying to counteract poor nutrition and its consequences by spreading health messages via television, posters and other media (e.g. FGÖ, n.d.). My assumption was that at least some of these health messages might be one reason, which leads people to consume unhealthy food, instead of encouraging them to eat healthier. Health messages might give the impression that they want to restrict one's freedom by telling people what to do, especially when the message is phrased in a determining way, which furthermore leads to reactance (e.g., Dillard & Shen, 2005; Grandpre et al., 2003; Miller et al., 2007). In line with previous studies (Werle et al., 2013; Haasova & Florack, 2019), I found a general strong relation between health and taste, which is encouraging, since this relation is not only limited to single food products, but also true for supermarket chains as well as entire meals, which are prepared with products of these different supermarket chains. The labelling of the meals with different supermarket chains was a new way of implicit health labelling in the context of health and taste, and indicated that brands are not only associated with health (Choi & Reid, 2018), but also with taste.

However, I could not detect any effect by reactance on the relation of expected healthiness and expected tastiness judgements or choice. Since the manipulation might have been too subtle, I think it is important to further investigate the possible impact of reactance on nutrition. These results might be relevant for initiatives of different sectors like education, politics, healthcare and others, who try to promote a healthy nutrition and lifestyle by spreading health messages. Health messages could be evaluated in order minimize the receiver's feeling of being restricted in her or his freedom. That way, the possibility of reactant behaviour like poor nutrition could be reduced, which in turn might decrease the risks of serious health issues as well.

References

Brehm, J.W. (1966). *A theory of psychological reactance.* Oxford, England: Academic Press.

Choi, H., & Reid, L.N. (2018). Promoting healthy menu choices in fast food restaurant advertising: Influence of perceived brand healthiness, brand commitment, and health consciousness. *Journal of Health Communication, 23*, 387-398. doi:https://doi.org/10.1080/10810730.2018.1455769

Dillard, J.P., & Shen, L. (2005). On the nature of reactance and its role in persuasive health communication. *Communication Monographs, 72*, 144–168. doi:https://doi.org/10.1080/03637750500111815

Fonds Gesundes Österreich. (n.d.) Mein Herz und ich. Gemeinsam gesund. Retrieved from: http://fgoe.org/Kampagne_Mein_Herz_und_ich_Gemeinsam_gesund.

Grandpre, J., Alvaro, E.M., Burgoon, M., Miller, C.H., & Hall, J.R. (2003). Adolescent reactance and anti-smoking campaigns: A theoretical approach. *Health Communication, 15*(3), 349–366. doi:http://dx.doi.org/10.1207/S15327027HC1503_6

Haasova, S., & Florack, A. (2019). Practicing the (un)healthy = tasty intuition: Toward an ecological view of the relationship between health and taste in consumer judgments. *Food Quality and Preference, 75*, 39-53. doi:https://doi.org/10.1016/j.foodqual.2019.01.024

Helmholtz Zentrum München. (n.d.). Fragebogen zur Ernährung in den letzten 12 Monaten. GINIplus Studie. Retrieved from https://www.ginistudie.de/fileadmin/GINI/pdf/GINI20_Fragebogen_Ernaehrung_Muster.pdf

Hong, S.M., & Page, S. (1989). A psychological reactance scale: Development, factor structure and reliability. *Psychological Reports, 64*, 1323–1326. doi:10.2466/pr0.1989.64.3c.1323

Kals, E., & Odenthal, D. (1996). Skalen zur Erfassung ernährungsbezogener Einstellungen und Entscheidungen. *Berichte aus der Arbeitsgruppe "Verantwortung, Gerechtigkeit, Moral", 95.*

Li, F., Bai, X., & Wang, Y. (2013). The scale of positive and negative experience (SPANE): Psychometric properties and normative data in a large Chinese sample. *Plos One, 8*(4). doi:https://doi.org/10.1371/journal.pone.0061137

Miller, C.H., Lane, L.T., Deatrick, L.M., Young, A.M., & Potts, K.A. (2007). Psychological reactance and promotional health messages: The effects of controlling language, lexical concreteness, and the restoration of freedom. *Human Communication Research, 33,* 219–240. doi:http://dx.doi.org/10.1111/j.1468-2958.2007.00297.x

Miron, A.M., & Brehm, J.W. (2006). Reactance theory-40 years later. *Zeitschrift für Sozialpsychologie*, *37*(1), 9-18. doi:https://doi.org/10.1024/0044-3514.37.1.9

Pietrowsky, R. (2018). Ernährung und Gesundheit. In R. Haring (Hrsg.), *Gesundheitswissenschaften* (S. 1-10). Berlin, Heidelberg: Springer. doi:https://doi.org/10.1007/978-3-662-54179-1

Raghunathan, R., Walker Naylor, R., & Hoyer, W. (2006). The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing, 70,* 170-184. doi:https://doi.org/10.1509/jmkg.70.4.170

Reilly, J., Methven, E., McDowell, Z., Hacking, B., Alexander, D., Stewart, L., & Kelnar, C. (2003). Health consequences of obesity. *Archives of Disease in Childhood, 88*, 748–752.

Roininen, K., Lähteenmäki, L., & Tuorila, H. (1999). Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite, 33*, 71-88. doi:10.1006/appe.1999.0232

Rust, P., Hasenegger, V., & König, J. (2017). Österreichischer Ernährungsbericht 2017. Retrieved from https://broschuerenservice.sozialministerium.at/Home/Download?publicationId=528

Scherschel Wagner, H., Howland, M., & Mann, T. (2015). Effects of subtle and explicit health messages on food choice. *Health Psychology*, *34*, 79-82. doi:http://dx.doi.org/10.1037/hea0000045

Statistik Austria. (2018, June 26). Gestorbene insgesamt seit 1970 nach Todesursachen, absolut. Retrieved from https://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/gesundheit/todesursachen/todesursachen_im_ueberblick/021985.html

United States Department of Agriculture (2018, July 31). What we eat in America, NHANES 2015-2016. Retrieved from https://www.ars.usda.gov/ARSUserFiles/80400530/pdf/1516/tables_1-36_2015-2016.pdf

Werle, C., Trendel, O., Ardito, G., Mallard, A., & Nat, P. (2013). Unhealthy food is not tastier for everybody: The "healthy = tasty" French intuition. *Food Quality and Preference, 28*, 116-121. doi:10.1016/j.foodqual.2012.07.007

WHO. (2018, February 16). Obesity and overweight. Retrieved from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

WHO. (2018, October 23). Healthy diet. Retrieved from https://www.who.int/news-room/fact-sheets/detail/healthy-diet

Appendix A: Tables

Table A1

Items and Cronbach's α values of used scales for the measurement of moderating variables

Hong's Psychological Reactance Scale	
Item	*α*
1. I find contradicting others stimulating. 2. When something is prohibited, I usually think "that's exactly what I'm going to do." 3. I become frustrated when I am unable to make free and independent decisions. 4. I consider advice from others to be an intrusion. 5. Advice and recommendations induce me to do just the opposite.	.71
General Health Interest	
Item	*α*
1. The healthiness of food has little impact on my food choices. 2. I am very particular about the healthiness of food I eat. 3. I eat what I like and I do not worry much about the healthiness of food. 4. It is important for me that my diet is low in fat. 5. I always follow a healthy and balanced diet. 6. It is important for me that my daily diet contains a lot of vitamins and minerals. 7. The healthiness of snacks makes no difference to me. 8. I do not avoid foods, even if they may raise my cholesterol. 9. Control item: As a proof that you read this question, please choose response option 1 (I do not agree at all).	.82
Explicitness of belief in the UTI	
Item	*α*
1. Things that are good for me rarely taste good. 2. There is no way to make food healthier without sacrificing taste.	.65

Table A2

Parameter estimates of the influence of covariates (diets, knowledge of supermarkets) on the relation between expected healthiness and expected tastiness ratings, using LMM

	No vegans/vegetarians		Only participants, who know the supermarkets	
Parameter	*F*	*b*	*F*	*b*
Fixed effects				
Intercept 3.91			3.85	
Conditions	1.0	-.41 (.41)	2.46	-.72 (.46)
Healthy Ratings	122,82***	.31*** (.04)	100.92***	.3*** (.05)
Healthy Ratings x Conditions	.35	.04 (.06)	1.82	.09 (.07)

Note. $^{+}$ = p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the influence of covariates on the relation between expected healthiness ratings and expected tastiness ratings of meals. The conditions variable is coded as 1 = induced reactance and 2 = neutral. Standard errors are shown in parentheses.

Table A3

Parameter estimates of the influence of GHI on the relation between expected healthiness and expected tastiness ratings, using LMM

Parameter		*F*	*b*
Fixed effects			
Intercept	5.45		
Conditions		1.14	-2.73 (2.56)
Healthy Ratings		2.51	-.7 (.26)
Healthy Ratings x Conditions		3.83^{+}	.74^{+} (.38)
GHI		.05	-.4 (.49)
GHI x Conditions		.75	.62 (.72)
GHI x Healthy Ratings		.01	.1 (.07)
GHI x Conditions x Healthy Ratings		3.43^{+}	-.2^{+} (.11)

Note. $^{+}$= p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the influence of GHI on the relation between expected healthiness ratings and expected tastiness ratings of meals. The conditions variable is coded as 1 = induced reactance and 2 = neutral. Standard errors are shown in parentheses.

Table A4

Parameter estimates of the influence of trait reactance on the relation between expected healthiness and expected tastiness ratings, using LMM

Parameter		*F*	*b*
Fixed effects			
Intercept	2.65		
Conditions		.82	1.25
			(1.38)
Healthy Ratings		14.2***	.41**
			(.14)
Healthy Ratings x Conditions		.06	-.05
			(.2)
Trait reactance		.5	.6
			(.4)
Trait reactance x Conditions		1.8	-.78
			(.58)
Trait reactance x Healthy Ratings		.35	-.05
			(.06)
Trait reactance x Conditions x Healthy Ratings		.22	.04
			(.09)

Note. $^{+}$ = p <. 10, * = p < .05, ** = p < .01, *** = p < .001. Values are parameter estimates predicting the influence of trait reactance on the relation between expected healthiness ratings and expected tastiness ratings of meals. The conditions variable is coded as 1 = induced reactance and 2 = neutral. Standard errors are shown in parentheses.

Appendix B: Zusammenfassung

Forscher fanden heraus, dass Konsumentinnen und Konsumenten dazu tendieren, ungesunde Speisen gesunden Speisen vorzuziehen und diese als leckerer zu bewerten. Diese Heuristik wird Unhealthy = Tasty Intuition (UTI) genannt (Raghunathan, Walker Naylor & Hoyer, 2006). Ein anderes Forscherteam hat jedoch herausgefunden, dass es eine gegenteilige Heuristik gibt: Die Studienteilnehmerinnen und –teilnehmer bewerteten die Lebensmittel anhand einer Healthy = Tasty Intuition (HTI), was bedeutet, dass sie Gesundheit positiv mit Geschmack assoziierten (Werle, Trendel, Ardito, Mallard & Nat, 2013). Diese sich widersprechenden Ergebnisse werfen die Frage auf, unter welchen Umständen der positive Zusammenhang zwischen Gesundheit und Geschmack geschwächt oder sogar zu einem negativen Zusammenhang wird. Das Ziel dieser Studie war es zu untersuchen, ob Reaktanz die Korrelation von Gesundheit und Geschmack beeinflusst. Psychologiestudierende wurden zufällig der Experimentalgruppe (vs. Kontrollgruppe) zugeteilt, welcher eine sehr bestimmende (vs. neutrale) Gesundheitsbotschaft gezeigt wurde, um Reaktanz zu erzeugen (Dillard & Shen, 2005). Danach bewerteten alle Teilnehmerinnen und Teilnehmer die erwartete Gesundheit und den erwarteten Geschmack von abgebildeten Speisen, welche mit einem von drei Logos von Supermarktketten versehen waren. Diese Logos sollten die Gesundheit der Speise auf implizite Weise darstellen. Ich konnte einen positiven Zusammenhang zwischen Gesundheit und Geschmack finden, jedoch führte die Reaktanzmanipulation nicht zum erwarteten Effekt auf jenen Zusammenhang.

Schlagwörter: Gesundheit, Geschmack, Lebensmittelpräferenz, Reaktanz, Gesundheitsbotschaften, Entscheidung

Appendix C: Questionnaire

1. Introduction and informed consent

Liebe
Teilnehmerin,
lieber Teilnehmer,

herzlichen Dank für Ihre Bereitschaft, an unserer Studie teilzunehmen.
Die Studie wird vom Arbeitsbereich Angewandte Sozialpsychologie und Konsumentenverhaltensforschung der Universität Wien durchgeführt.
Diese Studie, in der wir uns mit Meinungen und Einstellungen gegenüber Ernährung beschäftigen, dauert ca. 20 Minuten.
Es ist für uns wichtig, dass Sie alle Fragen beantworten. Wenn Sie sich bei einer Frage nicht ganz sicher sind, kreuzen Sie einfach das Feld an, das am ehesten zutrifft. Es geht um Ihre persönliche Einschätzung, es gibt keine richtigen oder falschen Antworten.

Die Studie dient ausschließlich wissenschaftlichen Zwecken. Die Befragung wird vom Institut für Angewandte Psychologie: Arbeit, Bildung, Wirtschaft der Universität Wien durchgeführt. Alle Informationen, die wir von Ihnen erhalten, werden vertraulich behandelt und anonymisiert ausgewertet, sodass keine Rückschlüsse auf Ihre Person möglich sind.
Im Rahmen der Studie werden Ihre Daten kodiert, d.h. im Falle der Abfrage von persönlichen Daten (z.B. Name; IP-Adresse; etc.), werden diese strikt von den Untersuchungsdaten (z.B. Fragebogendaten) getrennt. Durch diese Kodierung wird im Rahmen der wissenschaftlichen Auswertung kein Unbefugter Ihre persönlichen Daten erhalten. Nach Beendigung der Untersuchung werden alle Daten gelöscht, die einen Bezug zu Ihrer Person erlauben. Die Daten werden nicht an Personen weitergegeben, die an der Studie nicht beteiligt sind. In eine mögliche Veröffentlichung der Resultate der Untersuchung gehen die Daten anonymisiert ein. Wir sichern Ihnen zu, dass alle von uns erhobenen Daten entsprechend dem Datenschutzgesetz geschützt werden.

Mit dem Klicken des "Weiter"-Buttons, bestätigen Sie, die Einleitung gelesen zu haben, und willigen ein, an dieser Studie teilzunehmen:
"Ich bin damit einverstanden, dass meine Angaben ausschließlich für wissenschaftliche Zwecke am Institut für Angewandte Psychologie: Arbeit, Bildung, Wirtschaft aufbewahrt und ausgewertet werden. Nach Beendigung des Forschungsvorhabens werden alle Daten gelöscht, die einen Bezug zu meiner Person erlauben."
Vielen Dank für Ihre Teilnahme an der Studie!

2. Questionnaire about nutritional behaviour: Questions from questionnaire on nutrition in the last 12 months (Helmholtz Zentrum München, n.d.) and from scales for recording nutritional attitudes and decisions (Kals & Odenthal, 1996)

Wie oft haben Sie in den letzten 7 Tagen Brot (auch Toastbrot, Weckerl oder Ähnliches) konsumiert?

- Nie
- 1 Mal
- mehr als 1 Mal
- Täglich

Wie oft haben Sie in den letzten 7 Tagen Käse (auch Frischkäse, Weich- und Hartkäse) konsumiert?

- Nie
- 1 Mal
- mehr als 1 Mal
- Täglich

Wie oft haben Sie in den letzten 7 Tagen Fleisch (auch Wurst) konsumiert?

- Nie
- 1 Mal
- mehr als 1 Mal
- Täglich

Ab und zu esse ich kleine Snacks zwischen den Mahlzeiten.

Sie können zwischen "trifft überhaupt nicht zu" und "trifft vollständig zu" wählen.

trifft überhaupt nicht zu

trifft vollständig zu

Es kommt vor, dass ich weiter esse, obwohl ich gar nicht mehr hungrig bin

Sie können zwischen "trifft überhaupt nicht zu" und "trifft vollständig zu" wählen.

trifft überhaupt nicht zu

trifft vollständig zu

Für den Kauf und Verzehr von biologischen Lebensmitteln spricht, dass sie eindeutig gesünder sind als konventionell angebaute Lebensmittel.

Sie können zwischen "trifft überhaupt nicht zu" und "trifft vollständig zu" wählen.

trifft überhaupt nicht zu

trifft vollständig zu

Wenn ich mir vornehme, mich gesund zu ernähren, dann halte ich das auch durch.

Sie können zwischen "trifft überhaupt nicht zu" und "trifft vollständig zu" wählen.

trifft überhaupt nicht zu

trifft vollständig zu

Ich kaufe meine Lebensmittel vor allem in "normalen" Supermärkten.

Sie können zwischen "trifft überhaupt nicht zu" und "trifft vollständig zu" wählen.

trifft überhaupt nicht zu

trifft vollständig zu

Ich schaffe es oft nicht, mir Zeit zu nehmen, frische und gesunde Lebensmittel zu besorgen.

Sie können zwischen "trifft überhaupt nicht zu" und "trifft vollständig zu" wählen.

trifft überhaupt nicht zu

trifft vollständig zu

3.a. Why don't you eat healthy? (Experimental condition)

Bitte geben Sie nun an, warum Sie sich nicht gesund ernähren.

Ich ernähre mich nicht gesund,...

Sie können zwischen "Stimme ein wenig zu" und "Stimme vollständig zu" wählen.

	Stimme ein wenig zu				Stimme vollständig zu
weil mir die Zeit fehlt, mich um die Ernährung zu kümmern	○	○	○	○	○
weil mir gesunde Ernährung nicht wichtig ist	○	○	○	○	○
weil mir gesunde Ernährung zu teuer ist	○	○	○	○	○
weil ich mich gesund genug fühle	○	○	○	○	○
weil gesunde Ernährung uncool ist	○	○	○	○	○

3.b. Why do others eat unhealthy? (Control condition)

In Österreich ernähren sich viele Personen zu ungesund. Warum, glauben Sie, ist das so?

Personen ernähren sich nicht gesünder,...

Sie können zwischen "Stimme ein wenig zu" und "Stimme vollständig zu" wählen.

	Stimme nicht zu				Stimme vollständig zu
weil ihnen die Zeit fehlt, sich um die Ernährung zu kümmern	○	○	○	○	○
weil ihnen gesunde Ernährung nicht wichtig ist	○	○	○	○	○
weil für sie gesunde Ernährung zu teuer ist	○	○	○	○	○
weil sie glauben, sich gesund genug zu fühlen	○	○	○	○	○
weil sie gesunde Ernährung uncool finden	○	○	○	○	○

4.a. Health message (Experimental condition)

Wir raten Ihnen dringend sich gesund und ausgewogen zu ernähren!

Achten Sie in Zukunft auf folgende Punkte:

- **min. 400g Obst und Gemüse täglich**
- **weniger als 50g Zucker täglich**
- **weniger als 5g Salz täglich**

4.b. Health message (Control condition)

Die WHO macht folgende Ernährungsempfehlung um die Gesundheit zu verbessern:

- min. 400g Obst und Gemüse täglich
- weniger als 50g Zucker täglich
- weniger als 5g Salz täglich

Glauben Sie, dass dies sinnvoll für Menschen in Österreich ist?

Bitte geben Sie hier an für wie sinnvoll Sie dies erachten

- wenig sinnvoll
-
-
-
- sehr sinnvoll

5. Instructions for rating tasks

Jetzt möchten wir Ihnen einige Gerichte zeigen.

Wir bitten Sie diese Gerichte zu beurteilen. Die Gerichte wurden auf Basis von Produkten verschiedener Supermarktketten hergestellt. I ist klar, dass Sie viele Speisen nicht kennen oder noch nie konsumiert haben. Uns geht es nur um Ihre Schätzung. Gehen Sie nach dem Eindruck, den das jeweilige Gericht auf Sie in einer Speisekarte/ in einem Restaurant machen würde.

Bitte beurteilen Sie jedes Gericht einzeln. Ihre Beurteilung ist für uns sehr wichtig.

Es wird angezeigt, von welcher Supermarktkette die Produkte stammen, mit denen das Gericht zubereitet wurde.

6. Rating task – healthiness

Wie gesund schätzen Sie das dargestellte Gericht ein?

Je weiter oben Sie auf der Skala ankreuzen desto gesünder beurteilen Sie das Produkt.

+ 5 bedeutet eine sehr hohe Einschätzung der Gesundheit
– 5 bedeutet eine sehr niedrige Einschätzung der Gesundheit

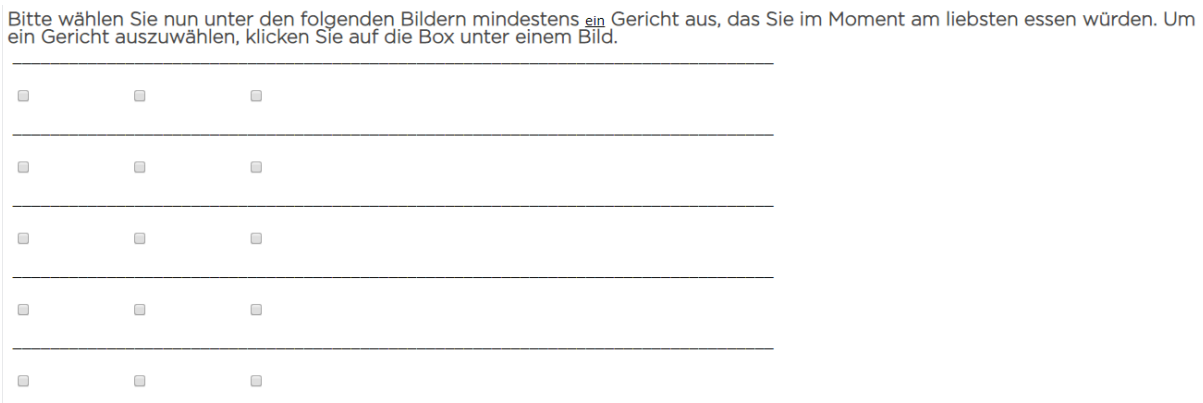
- +5
- +4
- +3
- +2
- +1

Gesundheit

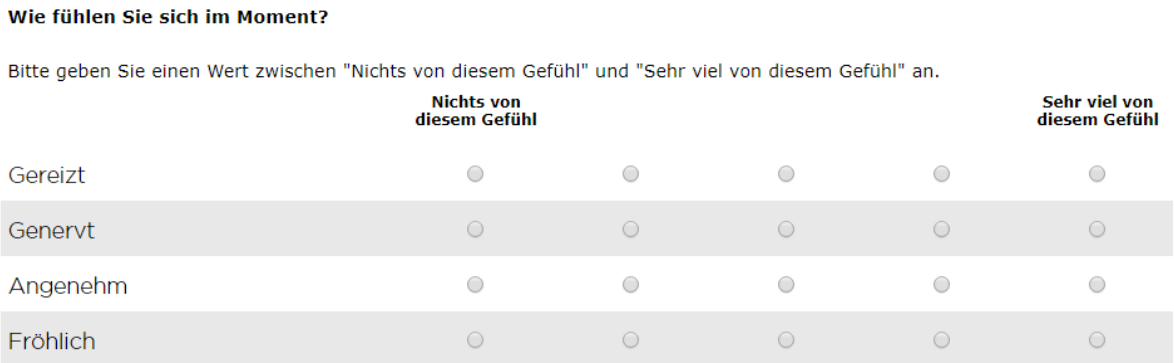
- -1
- -2
- -3
- -4
- -5

7. Rating task – tastiness

8. Choice task



9. Mood evaluation/Manipulation check: Items from SPANE (Li et al., 2013) & anger scale (Dillard & Shen, 2005)



10. General health interest (Roininen et al., 1999), **explicitness of belief in the UTI** (Raghunathan et al., 2006) and **shortened version of Hong's Psychological Reactance Scale** (Hong & Paige, 1989)

11. Supermarket-related questions

Kennen Sie die im Fragebogen gezeigten Supermarktketten?

	Ja	Nein
Penny Markt	○	○
Denn's Biomarkt	○	○
Merkur Markt	○	○

Haben Sie schon einmal bei den im Fragebogen erwähnten Supermarktketten eingekauft?

	Ja	Nein
Penny Markt	○	○
Merkur Markt	○	○
Denn's Biomarkt	○	○

Im Vergleich zu anderen Supermärkten, wie gesund schätzen Sie insgesamt das Lebensmittel-Angebot der folgenden Supermärkte ein?

	Sehr ungesund				Sehr gesund
Penny Markt	○	○	○	○	○
Merkur Markt	○	○	○	○	○
Denn's Biomarkt	○	○	○	○	○

12. Demographics

13. Open-ended question

Möchten Sie uns noch etwas mitteilen?

Vielen Dank für Ihre Teilnahme. Wenn Sie noch Anmerkungen oder Fragen an uns haben, haben Sie hier dazu die Gelegenheit, diese zu vermerken.

14. Debriefing