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Research report

Eating green. Consumers' willingness to adopt ecological food consumption behaviors☆

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ABSTRACT

Food consumption is associated with various environmental impacts, and consumers' food choices therefore represent important environmental decisions. In a large-scale survey, we examined consumers' beliefs about ecological food consumption and their willingness to adopt such behaviors. Additionally, we investigated in more detail how different motives and food-related attitudes influenced consumers' willingness to reduce meat consumption and to buy seasonal fruits and vegetables. We found consumers believed avoiding excessive packaging had the strongest impact on the environment, whereas they rated purchasing organic food and reducing meat consumption as least environmentally beneficial. Similarly, respondents appeared to be most unwilling to reduce meat consumption and purchase organic food. Taste and environmental motives influenced consumers' willingness to eat seasonal fruits and vegetables, whereas preparedness to reduce meat consumption was influenced by health and ethical motives. Women and respondents who preferred natural foods were more willing to adopt ecological food consumption patterns.

Introduction

In this study, we aimed to examine consumers' willingness to consume food in an environmentally friendly manner and tested which motives and attitudes influence the respondents' propensity to adopt green food consumption behaviors. Food consumption has been recognized as an environmentally significant behavior, because food production, transport, and consumption contribute to environmental problems, such as greenhouse gas emissions, farmland erosion, and excess wastage (e.g., Carlsson-Kanyama, 1998; Jungbluth, 2000; Tukker & Jansen, 2006). Overall, food consumption has been estimated to account for about 20–30% of the total environmental impact in the Western world (Tukker & Jansen, 2006). Unlike other consumption goods, food is a basic need and cannot be renounced or substituted. Depending on the ingredients, greenhouse gas emissions from different meals containing the same amount of calories and protein can vary, however, by a factor of nine (Carlsson-Kanyama, 1998). Dietary choices form an important part of overall sustainable consumption, and with daily food choices, consumers make important environmental decisions. A large body of research has examined consumers' willingness to purchase and consume organic food (e.g., Lockie, Lyons, Lawrence, & Grice, 2004; Magnusson, Arvola, Koivisto Hursti, Aberg, & Sjödén, 2001, 2003; Shepherd, Magnusson, & Sjödén, 2005; Squires, Juric, & Cornwell, 2001). However, we are only aware of an Australian study examining consumers' food-related environmental beliefs and behaviors, which included other factors of ecological food consumption, such as reducing meat consumption or purchasing local food products (Lea & Worsley, 2008). Therefore, we conducted a large-scale survey to examine consumers' beliefs about ecological food consumption and their willingness to adopt such behaviors. Furthermore, we examined how different motives for eating ecologically and different food-related attitudes influenced consumers' willingness to consume food in an environmentally friendly manner.

Perceived environmental benefits and willingness to consume food in an environmentally friendly manner

Making ecological food choices is difficult for consumers, as many different factors have to be taken into account. From the perspective of life cycle analysis (LCA), which examines the overall environmental impact of a product throughout its life cycle, it seems most important to avoid products transported by air, to prefer organic products, and to reduce meat consumption (Jungbluth, Tietje, & Scholz, 2000). Furthermore, heated

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greenhouse production should be avoided. Food packaging, however, tends to be relatively less important in terms of environmental impact (Jungbluth et al., 2000).

However, past research indicates that consumers are not necessarily aware of the environmental impact associated with product criteria. Although consumers generally believe that preferring locally produced and organic food is environmentally beneficial, they seem to overestimate the environmental impact caused by packaging material (Lea & Worsley, 2008; Tobler, Visschers, & Siegrist, 2011). Furthermore, consumers seem to be unaware of the environmental impact associated with meat consumption (Lea & Worsley, 2008). Similarly, consumers' willingness to eat ecologically does not necessarily reflect the ecological impact order based on LCA results. While most consumers indicated they composted food scraps and bought locally produced foods, they were clearly less willing to reduce meat consumption and buy organic products (Lea & Worsley, 2008).

In this study, we aimed to examine consumers' perception of the environmental benefits associated with ecological food consumption. Furthermore, we intended to investigate which ecological food consumption patterns consumers are willing to adopt. Based on the idea that behavioral changes occur over time and unfold through a series of different stages (Prochaska & Velicer, 1997; Prochaska, Redding, & Evers, 2008), we also assumed that willingness to consume ecologically occurs in steps, ranging from unwillingness to do the desired behavior to performing the desired behavior. The transtheoretical model (TTM) assumes that people move from the *precontemplation* stage (no intention of taking action in the near future, for instance because people lack information or motivation) through *contemplation* (intention to change, considering the associated costs and benefits) and then *preparation* (intention to take action in the immediate future with a concrete plan of action) to *action* (lifestyle and behavior have changed) (Prochaska & Velicer, 1997; Prochaska et al., 2008). People in the *modification* and *termination* stages sustain their new behaviors with decreasing temptation to relapse. The TTM by no means assumes that people progress through these stages in a linear way. For instance, people might also relapse (i.e., return to an earlier stage). A balance of costs and benefits of behavioral changes might also keep individuals stuck in the stage of contemplation for a long period of time (which the authors call *chronic contemplation* or *behavioral procrastination*).

Although this theory was traditionally used in the field of health behavior, consumers might also change their behavior toward ecological consumption through different stages of willingness. Changing behavior, in the domain of health behavior and ecological consumption, often requires consumers to overcome barriers, such as changing habits and lifestyle. Thus, the progress from willingness to change toward action might happen gradually. We therefore adapted the first four stages of the TTM to measure respondents' willingness to consume food in an environmentally friendly manner.

During the transition from unwillingness to act to performing the desired behavior, people might be motivated by different benefits associated with the new behavior. Knowing which motives encourage consumers to adopt ecological food consumption patterns could be useful for future campaigns promoting these behaviors. For this reason, in the second step of our study we examined consumers' motives for adopting ecological food consumption behaviors.

Motives for consuming food in an environmentally friendly manner

Consumers can have different motives underlying their food selection behaviors. Past research indicates that sensory appeal, healthiness, convenience, and price generally tend to be important factors influencing food choice (Scheibehenne, Miesler, & Todd, 2007; Steptoe, Pollard, & Wardle, 1995; Van Birgelen, Semeijn, & Keicher, 2009). The eco-friendliness of a food product, however, does not seem to have a major influence on consumers' food choice. Nevertheless, some ecological food patterns also have additional nonenvironmental benefits. For instance, seasonal and regional fruits and vegetables might be perceived as fresher, as they can be harvested when ripe and do not have to be transported for a long time. In fact, past research has shown that consumers tend to perceive locally produced food as of higher quality, particularly in terms of freshness and taste (Chambers, Lobb, Butler, Harvey, & Traill, 2007). Similarly, renouncing meat consumption can be motivated by health concerns or moral considerations regarding animal welfare (Beardsworth & Keil, 1991; Jabs, Devine, & Sobal, 1998). A recent study examined students' consumption of animal products and found that a large majority of vegetarians indicated they renounced meat for health reasons (Izmirli & Phillips, 2011). Students who were vegan or avoided some meat but not all, however, were motivated by both health and environmental reasons.

Thus, there might be several reasons for ecological food consumption behavior, which do not necessarily focus solely on the environmental outcome. Accordingly, ecological food consumption can have nonenvironmental benefits, which for many consumers might be more convincing for changing dietary choices than the environmental motive. To the best of our knowledge, no study has examined the different motives that might stimulate consumers to change toward ecological food consumption patterns that go beyond consuming organic products. Such information, however, would aid the development of persuasive campaigns to motivate consumers to adopt eco-friendly consumption patterns.

Therefore, we studied the influence of different motives on consumers' willingness to eat ecologically. As discussed above, consumers can reduce the environmental impact of their food consumption by eating less meat, and avoiding air transportation and greenhouse production (Jungbluth et al., 2000). The latter two criteria can be put in practice by eating fruits and vegetables that are seasonal where consumers live, as these do not need heated greenhouse production and can be produced locally (thus avoid long haulage, particularly by air). Accordingly, we focused in this study on consumers' willingness to reduce meat consumption and to eat seasonal fruits and vegetables.

In addition to the influence of motives, we also examined the influence of several food-related attitudes on reducing meat consumption and eating seasonal fruits and vegetables. Past research indicated that consumers strongly associate sustainability with naturalness (Verhoog, Matze, van Bueren, & Baars, 2003). Consumers concerned about the naturalness of food seem to be more willing to purchase organic food products (Lockie et al., 2004). Furthermore, people who buy organic food also seem to have a stronger health consciousness and seem to be willing to eat something else if they are convinced it improves their health (Schifferstein & Oude Ophuis, 1998). Although these relationships were found for organic food consumption, these attitudes might also influence other ecological food consumption behaviors. Hence, we included consumers' preference for natural food and their attitude toward a food's healthiness to test the influence of these two factors on willingness to reduce meat consumption and eat seasonal fruits and vegetables. As consuming seasonal fruits and vegetables allows consumers to avoid excessive packaging (such as tins), we additionally included participants' attitude toward avoiding waste to predict willingness to consume ecological fruits and vegetables.

In sum, our study investigated consumers' perception of the environmental benefit of several ecological consumption patterns

and their willingness to choose these behaviors. In the second part, we tested which motives and attitudes might determine consumers' willingness to reduce meat consumption and eat seasonal fruits and vegetables.

Methods

Participants

The present study was conducted within a large longitudinal research project examining the eating behavior of the Swiss population and related aspects of nutrition and food consumption. This project is a yearly study investigating how people's food consumption patterns change over time and which factors are related to these changes. The study was conducted in the German- and French-speaking regions of Switzerland. The questionnaire was developed in German and translated into French by a professional translation agency. The translated items were then checked by a researcher fluent in both languages.

A computer program randomly selected households of the telephone book in the German- and French-speaking regions. Based on the postal code, the selected households received a German or French questionnaire together with a stamped and addressed return envelope. In spring 2010, we sent the survey to the random sample of households using the regular Swiss post service. Persons who had not responded after 5 weeks received a reminder with another copy of the questionnaire. Our final sample consisted of 6,189 respondents (response rate = 29.6%), of whom 47.6% were men. The participants' mean age was 54.4 years (SD = 15.3, range 20–99), which is somewhat higher than the average age of the adult Swiss population of 49 years (BFS, 2009). The majority of our respondents (70.1%, n = 4,336) lived in the German-speaking part of Switzerland (census: 64%), and 29.9% (n = 1853) resided in the French-speaking part (census: 20%). The Italian- and Romansh-speaking regions were not included in our survey.

Most participants indicated a monthly income between 5,001 and 7,000 Swiss Francs, which is comparable with the mean income in the Swiss population (6,465 Francs). The majority of our respondents had attended vocational school (34%, n = 2,056) or higher secondary school (29%, n = 1,762). Twenty-eight percent (n = 1,706) had a college or university degree, and 10% (n = 585) indicated they had either no education, or primary or lower secondary school education. Compared to the general Swiss population, our sample had a higher educational level.

In an additional telephone survey, we examined the demographic variables of nonresponders. Among the random sample of 200 nonresponders from the German-speaking part, 72% (n = 144) were reached with a maximum of five telephone calls at different times a day. Compared to the participants, nonresponders were more likely to be male (56.3% of nonresponders vs. 47.6% of participants) and to have a lower educational level (primary or lower secondary school, 22.0% of nonresponders vs. 7.1% of participants). The nationality (Swiss 83.8% vs. 82.7%) and mean age (55.4 vs. 54.4) were similar between nonresponders and responders.

Questionnaire

We asked participants how they perceived the *environmental benefit* of six different ecological consumption patterns (see Table 1). Respondents could indicate the perceived environmental benefit of each pattern on a scale ranging from 1 (*very small environmental benefit*) to 6 (*very large environmental benefit*).

We also measured consumers' *willingness to show environmentally friendly food consumption patterns*. The list of behaviors encompassed buying regional food products, eating seasonal fruits and vegetables only, reducing meat consumption (to a maximum of twice a week), avoiding food products imported by airplane, and purchasing organic food (see Table 2). Based on the TTM (Prochaska & Velicer, 1997; Prochaska et al., 2008), we assessed people's level of intention in the following four stages: we operationalized (1) *precontemplation* with the response option "I am not doing this and I am not willing to," whereas we measured (2) *contemplation* with the option "I would like to do this, but I do not know how." For the (3) *preparation* stage, we used the statement "I would like to do this, and I already know how to start," and we operationalized the (4) *action* stage with the option "I am doing this already." Respondents had to mark their current stage for each of the five behaviors.

As independent variables of willingness to show green food consumption patterns, we measured the respondents' food-related

Table 1
Means (and standard deviations) for perceived environmental benefit of food consumption patterns for total sample and each gender, including results of independent t-tests for gender.

	N	M (SD)			t	Df	r
		Total	Men	Women			
Avoid food products with excessive packaging	6,082	5.37 (1.06)	5.17 (1.91)	5.56 (.88)	−14.62**	6,063	.18
Buy regional food	6,082	5.29 (1.07)	5.10 (1.17)	5.46 (.93)	−13.12**	6,063	.17
Avoid food products that were imported by airplane	6,067	5.10 (1.40)	4.91 (1.51)	5.27 (1.27)	−9.96**	6,048	.13
Eat only seasonal fruits and vegetables	6,082	4.95 (1.34)	4.70 (1.42)	5.17 (1.21)	−13.77**	6,063	.17
Buy organic food	6,056	4.15 (1.59)	3.80 (1.60)	4.46 (1.51)	−16.47**	6,037	.21
Eat less meat (maximum once or twice per week)	6,056	3.75 (1.71)	3.52 (1.70)	3.96 (1.69)	−10.21**	6,037	.13

Note: Perceived environmental benefit was rated on a 6-point Likert scale ranging from 1 (*very small environmental benefit*) to 6 (*very large environmental benefit*).
** $p < .001$.

Table 2
Frequencies of respondents in the stages of willingness to show environmentally friendly food consumption patterns.

	N	Frequencies (in row %)			
		Precontemplation	Contemplation	Preparation	Action
Buy regional food	6,095	10.0	5.2	17.1	67.7
Eat only seasonal fruits and vegetables	6,104	15.5	5.3	16.3	62.9
Eat less meat (maximum once or twice per week)	6,093	36.3	5.4	11.4	46.9
Avoid food products that were imported by airplane	6,066	28.4	13.4	16.8	41.4
Buy organic food	6,059	35.9	5.9	18.7	39.4

Table 3
Multinomial regression for willingness to eat seasonal fruits and vegetables, with *B*-values (*B*), standard errors (SEs), odds ratios (ORs), and 95% confidence intervals (95% CIs).

	Precontemplation (n = 889)			Action (n = 3,560)		
	B (SE)	OR	95% CI	*B* (SE)	OR	95% CI
Gender[a]	.03 (.10)	1.03	0.85–1.24	**.29**** (.07)	1.34	1.16–1.54
Age	**.01**** (.00)	1.01	1.01–1.02	**.01**** (.00)	1.01	1.01–1.02
Lower vs. vocational education	−.07 (.18)	0.93	0.66–1.31	−.09 (.13)	0.92	0.70–1.19
Higher vs. vocational education	−.14 (.10)	0.87	0.71–1.06	−**.23*** (.08)	0.80	0.69–0.92
Seasonal fruits and vegetables are better for the environment	−**.23**** (.04)	0.80	0.74–0.85	.06 (.03)	1.06	1.00–1.13
Seasonal fruits and vegetables taste better	−**.23**** (.04)	0.80	0.74–0.86	**.15**** (.03)	1.16	1.09–1.24
By buying seasonal fruits and vegetables, one can save money	.06 (.03)	1.06	1.01–1.13	.04 (.02)	1.04	0.99–1.08
Naturalness	−**.17*** (.05)	0.84	0.76–0.93	**.28**** (.05)	1.32	1.21–1.45
Waste	−.01 (.04)	0.99	0.92–1.07	**.18**** (.03)	1.20	1.13–1.27
Health consciousness	−**.10*** (.04)	0.90	0.84–0.97	.06 (.03)	1.06	1.01–1.12

Note: R^2 = .20 (Nagelkerke). Reference category for the multinomial regression was the contemplation/preparation stages (n = 1,246); significant coefficients (*B*s) are shown in bold.
[a] Gender was coded 0 = male, 1 = female.
* $p < .01$.
** $p < .001$.

attitudes, namely (1) *importance of naturalness in food choices* and (2) *health consciousness* (i.e., consumers' importance of a food product's healthiness). For the consumption of seasonal fruits and vegetables, we further included *awareness of waste production* as a predictor. All items were presented as statements, and participants could rate their level of agreement on a 6-point Likert scale. We used a scale measuring the *importance of naturalness in food choices* (Cousin & Siegrist, in preparation), consisting of six items (e.g., "Natural foods taste better than other foods," "Natural foods are better for my health," α = .87). Participants' *health consciousness* was assessed with two items ("I do not select foods according to their healthiness," "I eat what I like, I don't care if it is healthy as well"; both items were reversed, α = .75). We measured *awareness of waste production* with three items (e.g., "I try to shop in such a way that I will not have leftovers to throw away," "I try to produce as little waste as possible," α = .75). For all three food-related attitude scales, we calculated the mean score for each participant.

We measured *frequency of meat consumption* with four items, asking participants how often they consumed beef or veal, pork, poultry, and sausages or other processed meat products. The response format was *several times a day* (5), *daily* (4), *several times a week* (3), *several times a month* (2), *several times a year* (1), and *rarely or never* (0).

To predict willingness to reduce meat consumption and eat seasonal fruits and vegetables, we asked participants how convincing they found different *motives for changing* the respective behavior. These motives addressed concerns for health, environment, price, taste, and animals' suffering, if applicable to the behavior (see Tables 3 and 4). Participants could indicate the level of persuasiveness on a 6-point Likert-scale ranging from *not convincing* (1) to *very convincing* (6). Finally, participants indicated their gender, age, education, and household income.

Data analyses

In the descriptive part, we analyzed consumers' perceived environmental friendliness of ecological consumption patterns as well as their willingness to show these behaviors. Past studies suggest gender differences: women tended to show higher levels of environmental concern but lower levels of environmental knowledge (Davidson & Freudenburg, 1996; Schahn & Holzer, 1990; Stern, Dietz, & Kalof, 1993). There might have been a gender difference in our participants' environmental judgment of food consumption patterns. We therefore used independent *t*-tests to test whether men and women differed in their estimation of perceived environmental benefit.

In a further step, we analyzed consumers' willingness to consume seasonal fruits and vegetables and their willingness to reduce meat consumption. As these dependent variables were not scaled on an interval level, we considered conducting ordinal regression analysis. However, one critical assumption for ordinal regression analysis is that of parallel slopes (Borooah, 2002), which was violated in our dataset (ps < .001). The multinomial regression analysis, however, allows the slope coefficient to be different between the outcomes (Borooah, 2002). Therefore, we conducted multinomial regression analyses to predict willingness to eat

Table 4
Multinomial regression for willingness to reduce meat consumption, with *B*-values (*B*), standard errors (SEs), odds ratios (ORs), and 95% confidence intervals (95% CIs).

	Precontemplation (n = 2,115)			Action (n = 2,686)		
	B (SE)	OR	95% CI	*B* (SE)	OR	95% CI
Gender[a]	−**.28*** (.09)	0.75	0.63–0.90	**.57**** (.08)	1.76	1.51–2.06
Age	.00 (.00)	1.00	1.00–1.01	.01 (.00)	1.01	1.00–1.01
Lower vs. vocational education	−.13 (.16)	0.88	0.64–1.20	.09 (.14)	1.09	0.82–1.44
Higher vs. vocational education	.02 (.09)	1.02	0.85–1.22	.18 (.08)	1.19	1.01–1.41
Reducing meat consumption is healthier	−**.55**** (.03)	0.58	0.54–0.61	**.19**** (.03)	1.21	1.13–1.29
Reducing meat consumption is better for the environment	−**.09*** (.03)	0.92	0.86–0.97	−**.14**** (.03)	0.87	0.82–0.92
By reducing meat consumption, one can save money	−.01 (.03)	0.99	0.93–1.04	−.04 (.03)	0.96	0.92–1.02
By reducing meat consumption, one can prevent animals suffering	−**.13**** (.03)	0.88	0.84–0.93	.03 (.02)	1.03	0.99–1.08
Naturalness	.12 (.05)	1.13	1.02–1.25	**.28**** (.05)	1.32	1.20–1.46
Health consciousness	−.08 (.04)	0.92	0.86–0.99	.07 (.03)	1.07	1.01–1.14

Note: R^2 = .35 (Nagelkerke). Reference category for the multinomial regression was the contemplation/preparation stages (n = 977); significant coefficients (*B*s) are shown in bold.
[a] Gender was coded 0 = male, 1 = female.
* $p < .01$.
** $p < .001$.

seasonal fruits and vegetables and reduce meat consumption. As the fractions of people in the contemplation and preparation stages were rather small (see Table 2), we grouped these respondents into one category for further analyses, called "change stages." We then used the combined category of contemplation and preparation (i.e., people who considered behavioral changes but had not yet implemented them) as a reference group and compared them to participants in the precontemplation (i.e., who were not willing to perform these behaviors) and action (i.e., who were already showing these behaviors) stages.

As predictors, we used sociodemographics (gender, age, and education), environmental and nonenvironmental motives for changing these behaviors, and different food-related attitudes (i.e., toward naturalness, healthiness, and waste production). We formed three education groups: (a) lower education (secondary school or lower), (b) vocational education, and (c) higher education (higher secondary school, college, or university). In Switzerland, the largest share of the population (44%) has a vocational school degree (BFS, 2009); therefore, we used this group as a baseline for education and compared the two other education levels with vocational education.

Results

We first examined the environmental benefit consumers associated with the six different ecological food consumption patterns and studied consumers' willingness to adopt five of these behaviors. In the second step, we investigated the influence of different motives and food-related attitudes.

Perceived environmental benefit of ecological food consumption patterns

Table 1 shows that consumers believed avoiding excessive packaging had the strongest impact on the environment, followed by purchasing regional food products. Avoiding air imported products and eating seasonal fruits and vegetables were perceived as somewhat less environmentally relevant. Consumers clearly rated purchasing organic food and foregoing meat as least environmentally beneficial.

To test for gender differences, we conducted an independent *t*-test for the perceived environmental benefit for each food consumption behavior. Women perceived all consumption patterns as more eco-friendly than men. The largest difference was found for purchasing organic food products. However, although the results were significant, the effect sizes of the gender differences were moderate.

Consumers' perception of the environmental benefit of meat reduction could be influenced by their meat consumption. Participants eating more meat might be less willing to acknowledge that reducing this behavior could be ecologically relevant. Therefore, we used Pearson correlation to test the relationship between the perceived environmental benefit of meat reduction and the frequency of meat consumption. Generally, the more frequently consumers consumed meat, the smaller they perceived the environmental benefit of reducing meat consumption ($r = -.18$ for beef or veal, $r = -.24$ for pork, $r = -.09$ for poultry, and $r = -.18$ for sausages or other processed meat products, all $ps < .001$).

Willingness to adopt ecological food consumption patterns

Overall, most respondents indicated they already bought regional food and ate seasonal fruits and vegetables ("action stage"; see Table 2). A substantially lower fraction had reduced meat consumption and avoided products imported by air. The fewest consumers indicated they bought organic food products. In line with these results, we found the largest fraction of unwilling consumers in the domain of reducing meat consumption and buying organic food ("precontemplation stage").

Generally, most consumers were in either the precontemplation stage or the action stage. That is to say, they were either unwilling to adopt a behavior or were already showing it. Only for avoiding air imported food products, there was a somewhat larger fraction of respondents in the contemplation stage compared to the other consumption patterns (i.e., consumers were willing to adopt the behavior but did not know how to do it).

Determinants influencing consumption of seasonal fruits and vegetables

For the multinomial regression analyses, we combined participants in the change stages (i.e., contemplation and preparation stages) and compared them to the respondents in the precontemplation (i.e., people unwilling to change their behavior) and action (i.e., people who showed the desired behavior) stages.

Table 3 shows that consumers' preference for natural food was a strong predictor of their willingness to eat seasonal fruits and vegetables. If respondents prioritized their food's naturalness, they were less likely to be in the precontemplation stage (i.e., unwilling to change their behavior) and more likely to be in the action stage (i.e., already showing this behavior) rather than being in the change stages. The motive addressing taste was the most influential argument for eating seasonal fruits and vegetables. If participants were convinced that seasonal fruits and vegetables taste better, the probability of being in the precontemplation stage decreased, and the likelihood of being in the action stage increased, compared to the change stages.

Older respondents had a higher probability of being in either the precontemplation or the action stage, rather than considering changing their behavior. Participants concerned about their health and convinced about the environmental benefits were more likely to be in the change stages than being in the precontemplation stage.

Women, respondents with higher rather than vocational education, and those concerned about producing waste were more likely to eat seasonal fruits and vegetables (i.e., be in the action stage) than in the change stages. These factors, however, did not distinguish between people in the precontemplation stage and those considering changing their behavior. The motive addressing money did not significantly influence people's willingness to eat seasonal fruits and vegetables.

Determinants influencing reduction of meat consumption

Gender was clearly the strongest predictor of respondents' willingness to reduce meat consumption (see Table 4). Women were less likely to be unwilling (i.e., to be in the precontemplation stage) and more likely to have already reduced their meat consumption (i.e., be in the action stage) compared to the change stages. Another strong predictor was the conviction that reducing meat consumption is better for one's health. People believing that reducing meat consumption had a positive effect on their health were less likely to be in the precontemplation stage and more likely to be in the action stage than in the change stages.

The influence of the ecological motive was mixed. Participants convinced about the environmental benefit of reducing meat consumption were less likely to be in the precontemplation stage than the change stages. However, they were more likely to consider changing their behavior than be in the action stage.

The motive addressing the suffering of animals was only partially influential. Participants convinced by this argument were

more likely to consider reducing their meat consumption (i.e., be in the reference group) rather than being in the precontemplation stage. However, the motive about animals suffering did not significantly distinguish between respondents considering changing their behavior and participants in the action stage.

If respondents perceived the naturalness of their food as important, they were more likely to be in the action stage than in the change stages. This attitude, however, did not significantly distinguish between the precontemplation stage and the stage where people considered changing their behavior.

The motive concerning money had no significant influence on consumers' willingness to reduce meat consumption. Neither age, nor educational level, nor health consciousness significantly influenced consumers' willingness to reduce meat consumption.

Discussion

In this study, we aimed to examine consumers' perception of the environmental benefits of different ecological food consumption behaviors, how willing consumers were to adopt these behaviors, and how different motives and attitudes influenced this willingness. The findings for these research questions are discussed in the following.

Ecological food consumption patterns: perceived environmental benefit and willingness to adopt these behaviors

Among all ecological consumption patterns, participants believed that reducing waste by avoiding excessive packaging had the largest environmental benefit. This appraisal stands in contrast to the LCA results, which do not regard packaging as one of the most relevant environmental criteria (Jungbluth et al., 2000). Consumers' tendency to overestimate the environmental harm associated with packaging is supported by similar findings in past research (Lea & Worsley, 2008; Tobler et al., 2011; Van Dam, 1996). One possible explanation for this overrating might be that, in contrast to production and transportation, consumers personally experience the postconsumption of packaging (as they have to dispose of it), and this may therefore excessively influence their environmental assessment (Van Dam, 1996). Furthermore, waste reduction has been heavily promoted in Switzerland by environmental campaigns, which might have also raised consumers' awareness.

In contrast, consumers seem to be less aware of the environmental impacts associated with meat production. Whereas LCA results indicate that lowering meat consumption is very environmentally relevant (Jungbluth et al., 2000), consumers assessed reducing meat consumption as the least environmentally friendly of all consumption patterns. Since lowering meat consumption might be difficult for consumers, denying its environmental benefit may be a strategy for reducing dissonance. That is to say, consumers might excuse their unwillingness to reduce meat consumption by dismissing this behavior as not environmentally relevant. To test this assumption, we examined the relationship between meat consumption frequency and the perceived environmental benefit of reducing meat consumption. We found a significant negative correlation; people eating meat more frequently attributed less environmental benefit to reducing meat consumption. However, the relationship was not very pronounced, suggesting that consumers' underestimation of the environmental relevance of meat consumption is not solely motivated by dissonance reduction, but might also reflect lack of knowledge.

Interestingly, organic food consumption was not assessed as a very environmentally beneficial consumption pattern. This is somewhat surprising as, in Switzerland, retailers and environmental organizations heavily promote organic food as an environmentally friendly option. Furthermore, a past study found that consumers strongly associate environmental friendliness with organic production (Tobler et al., 2011). A possible explanation for this discrepancy might be that there is a large variety of organic labels in Switzerland. These labels differ in terms of regulations and, therefore, may not necessarily be transparent to consumers. By assessing the consumption of organic foods as not very environmentally friendly, consumers might therefore express their distrust of organic labels. In a focus group study, consumers namely expressed mistrust about whether something labeled as organic was actually organic (Padel & Foster, 2005). Thus, on the one hand, consumers might believe that organic food actually is environmentally beneficial but, on the other hand, distrust that the products with organic labels are truly organically produced.

Consumers' willingness to adopt ecological food consumption patterns mirrored their beliefs about the environmental benefits of these behaviors. Whereas the majority of consumers reported they already consumed regional and seasonal food, a large fraction of respondents was unwilling to reduce their meat consumption or to buy organic food.

Eating seasonal and regional food requires only small dietary changes. All foods can still be eaten; consumers only have to consider and choose the fruits and vegetables that are currently in season. Thus, the meal compositions can mainly remain unchanged. Reducing meat consumption, however, often necessitates adaptations of the meal compositions. In the Western world, meat traditionally represents the centerpiece of a main course, which is typically accompanied by other foods as side dishes (Jensen & Holm, 1999; Sobal, 2005). Thus, meat appears to constitute an important meal component, which consumers might not be willing to forego. For vegetarian meals, meat substitutes often replace meat as a core meal constituent, or vegetables are prepared in a similar manner as in meat dishes. As these adaptations require more cooking skills and effort, it hardly surprising that consumers are less willing to reduce their meat consumption.

Overall, our results are supported by findings from an Australian study that consumers rated composting household food scraps and purchasing locally grown food as very environmentally friendly, and they also most frequently performed these behaviors (Lea & Worsley, 2008). As in our study, consumers also found buying organic food and reducing meat consumption least environmentally relevant and reported having adopted these behaviors least frequently. Thus, consumers' misconceptions about the environmental importance of consumption patterns and their propensity to consume ecologically appear to be similar in Switzerland and Australia. It therefore seems conceivable that these results are also generalizable to other developed countries.

For all food consumption patterns, women estimated the environmental benefits significantly higher than men. However, with a large sample such as ours, tests tend to get significant results even with small effects (Royall, 1986). We found moderate effect sizes for all consumption patterns, indicating that the differences between men and women are limited. Furthermore, men and women put the different food consumption patterns in the same order with respect to their environmental benefit. Overall, our findings therefore indicate that the misconceptions about the environmental benefits of food consumption patterns are similar for both genders.

With regard to the stages of willingness to adopt behavior, we found the majority of the participants were either in the *action* stage, thus already showing ecological food consumption patterns, or in the *precontemplation* stage, unwilling to show these behaviors. The transition over the different stages might therefore happen easily; once consumers decide to change toward a more ecological food consumption pattern, they appear to implement

this rather quickly. Thus, consumers do not seem to encounter many barriers hindering them from transforming their willingness into action. However, compared to the other consumption patterns, a rather large fraction of consumers indicated they were willing to avoid air-imported products but did not know how to do this. Thus, consumers who are willing to avoid air-imported products might find it challenging, as retailers usually do not indicate a product's means of transportation. Encouraging consumers to avoid air-imported products therefore does not seem to suffice without a labeling scheme indicating a product's transportation mode.

Determinants of ecological food consumption

In the second part of our study, we investigated which factors influence consumers' willingness to eat seasonal fruits and vegetables and reduce meat consumption. We particularly examined which environmental and nonenvironmental motives for ecological food consumption influenced consumers' willingness to adopt these behaviors.

Overall, the better taste argument was the strongest motive for consumers' willingness to eat seasonal fruits and vegetables, whereas the most influential motive for reducing meat consumption was the belief that it was beneficial for one's health. The latter finding to some extent contradicts the results of Izmirli and Phillips (2011) who found that vegetarians renounced meat mainly for health reasons, whereas avoidance of some meat was also motivated by concern for the environment. A possible explanation for this discrepancy might be the differences between the two samples. While the described study surveyed students only, our sample included people of the general population; consequently, our sample was distinctly older on average. Another study found that the reasons for buying ecologically produced food varied largely among different age groups (Wandel & Bugge, 1997). Young people bought ecological food mainly for environmental reasons, people of the middle age groups considered both their health and environmental reasons, whereas consideration for their health was the most prominent reason in the oldest age group. This age difference might also apply for the motives to reduce meat consumption. Thus, younger people might generally be more motivated to change their eating behaviors for environmental reasons while older individuals might find health reasons more convincing.

Interestingly, we found that the environmental benefit argument had a mixed effect on consumers' willingness for both ecological food patterns. Participants convinced by the ecological claim were more likely to consider reducing their meat consumption and eating seasonal fruit and vegetables. However, for the consumption of seasonal food, this motive did not significantly influence the transition from considering changing to action. In the case of meat reduction, the effect was even counterintuitive; participants who believed that reducing meat consumption was environmentally beneficial were less likely to actually show this behavior. Similarly, the ethical aspect of animals suffering significantly influenced only consumers' willingness to consider reducing their meat consumption, not the transition to actual behavior. Thus, some motives might encourage consumers to move from one stage to another, but not necessarily influence their transition through all stages. Consumers may need additional incentives or cues to reach this final stage.

The argument addressing the cost savings associated with ecological food patterns had no significant influence on consumers' willingness to lower meat consumption and their willingness to eat seasonal fruits and vegetables. This result is supported by the findings of another Swiss study, in which costs did not play an important role in green purchases (Tanner & Kast, 2003). Thus, the financial benefit of ecological food patterns seems to be either unconvincing or outweighed by stronger motives.

We also found that women were significantly more willing to eat less meat and were also more likely to eat seasonal fruits and vegetables. This gender difference was particularly large for meat consumption; men were substantially less willing to lower their meat intake. This is of little surprise as men compared to women generally eat more meat (e.g., Guenther, Jensen, Batres-Marquez, & Chen, 2005; Jensen & Holm, 1999) and appear to experience more hedonic pleasure of eating meat (Kubberød, Ueland, Rødbotten, Westad, & Risvik, 2002). Consequently, women appear to be more likely to avoid meat than men, particularly beef and veal, lamb, and pork (Phillips et al., 2011). Meat, especially red meat, is often associated with strength, power, and virility, and meat is considered an archetypical masculine food (Holm & Møhl, 2000; Jensen & Holm, 1999; Sobal, 2005). Men therefore might find it more difficult to reduce this type of consumption. Overall, our results suggest it might be most promising to address women when promoting ecological food consumption, as they seem to be more willing to adopt green food consumption patterns. Furthermore, women very often are a household's gatekeeper, meaning that they decide what food is purchased and what the other household members eat (Tanner & Kast, 2003).

Consumers' willingness to consume food in an environmentally friendly manner was further increased if consumers attached importance to their food's naturalness and healthiness. This is in line with past research indicating that consumers have a strong association of sustainability with the naturalness of food (Verhoog et al., 2003). The transition from considering to consuming seasonal fruits and vegetables was additionally influenced by consumers' awareness of waste production. Thus, consumers who try minimizing waste production probably avoid preserved fruits and vegetables as they are more excessively packaged (e.g., tins) and therefore favor fresh produce.

Limitations

Despite our large-scale survey and our ability to analyze the predictors of two ecological food consumption patterns in more detail than previous studies, our study also faced several limitations. For instance, our data were based on self-reported behavior, which does not necessarily equal actual behavior. On the one hand, consumers might mistake their consumption patterns as ecological because they lack information. For example, consumers might report eating seasonal vegetables without actually knowing which vegetables are seasonal at a given time. Similarly, which provenance consumers perceive as regional is uncertain. They might, for instance, consider products relatively regional if they come from neighboring countries. On the other hand, participants might overreport on their willingness to adopt such behaviors for reasons of social desirability. However, the survey was conducted anonymously, which lowers participants' measures of social desirability to some extent (Joinson, 1999). Furthermore, measuring actual behavior would not have allowed insights into consumers' stages of willingness to adopt ecological food consumption behaviors. Future studies, however, might take direct observations into account to measure consumers' willingness to perform ecological food consumption behaviors.

It is also possible that the wording of the items to some extent biased consumers' indication of their ecological consumption behaviors. Whereas the more accepted behaviors (e.g., "buying regional food") were worded rather generally without indication of frequency, the reduction of meat consumption was defined quite strictly, namely eating meat twice per week at most. That way, consumers might find it easier to indicate they adopted the less defined behaviors, whereas meat consumption could not be

misinterpreted. However, in the study by Lea and Worsley (2008), consumers were asked more generally about their willingness to reduce meat consumption, without indication of frequency. As in our study, consumers still indicated they were least willing to adopt this behavior.

This study was part of a longitudinal research project and consumers were informed in the cover letter that if they participated, they would be sent further questionnaires in the following years. This might have impeded consumers' willingness to respond and consequently limit the representativeness of the study. People particularly interested in nutrition might have been more likely to participate. Moreover, our sample had a higher education level than the average Swiss population. Our results might, consequently, overestimate consumers' willingness to adopt ecological food consumption behaviors.

Furthermore, we focused on consumers' food-related attitudes and beliefs in this survey. However, consumers' green food consumption behaviors might be influenced by further factors. For future studies, additional determinants, such as ecological attitudes, knowledge, or values, should be included. It also seems worthwhile to examine in further experimental studies whether the identified motives actually persuade people to change their behavior.

Conclusions

Overall, our findings suggest that consumers generally appear to lack knowledge about the environmental relevance of various ecological food consumption patterns, which indicates that information campaigns about this topic might be worthwhile. Future environmental education campaigns should focus on the most environmentally relevant consumption patterns: for instance, emphasize the environmental impact associated with meat consumption, heated greenhouse production, and air transportation. Furthermore, campaigns should highlight the environmental benefits of organic food products and, to encourage organic food consumption, strengthen consumers' trust in the organic labels.

Furthermore, our findings indicate consumers' willingness to perform different ecological consumption patterns might be influenced by different motives. Accordingly, persuasive campaigns should take into account which motives might be most promising in order to encourage consumers to adopt these behaviors. For the consumption of seasonal fruits and vegetables, for instance, it might be most beneficial to combine the argument of better taste and environmental friendliness. Reducing meat consumption, however, might be best promoted by highlighting the associated health benefits as well as by claiming that by foregoing meat one can prevent animals' suffering. The argument of saving money, however, does not seem to be a promising claim to persuade consumers to adopt ecological food consumption patterns, at least not for reducing meat consumption and eating seasonal fruits and vegetables.

Altogether, environmental motives alone might not be the strongest persuasion strategy to encourage ecological food consumption. They might encourage consumers to consider changing their behavior, but may not be sufficiently motivating for consumers to change their consumption patterns. As health or taste claims might have a stronger influence on consumers' willingness to consume in an environmentally friendly way, these might be included in future campaigns promoting ecological food consumption. Such nonenviromental benefits should be genuine and agreed upon by experts. Therefore, the cooperation of several organizations with different foci (such as health or animal welfare) could be very fruitful.

Information campaigns and persuasion strategies alone might not suffice to increase ecological food consumption, however. Instead, a multifaceted approach seems more promising (Tanner & Kast, 2003). For instance, even if consumers are given information about the environmental impacts of food consumption, assessing the ecological aspect of food products remains challenging. It might, for example, be necessary to indicate seasonal fruits and vegetables, as consumers may lack knowledge about seasonality. If a product shows conflicting features (e.g., a regional vegetable from heated greenhouse production), consumers have to make tradeoffs, which is considered one of the most difficult challenges in decision making (Hammond, Keeney, & Raiffa, 2002). Thus, it might be most promising to develop means of signaling a product's overall environmental friendliness in a simple and understandable way. A label based on LCA results, for instance, could facilitate ecological consumption. However, retailers and manufacturers might not be willing to label their products as environmentally harmful. Such labels, therefore, might need to be regulated by law.

Past research also indicates that price generally seems to be an important factor in consumers' food choice (Scheibehenne et al., 2007; Steptoe et al., 1995; Van Birgelen, Semeijn, & Keicher, 2009). Policy changes that increase prices of environmentally harmful food products might therefore additionally motivate people to consume food in an ecological manner. A carbon tax, for instance, would increase the price of food products imported by plane and, therefore, make it less attractive for consumers. Nevertheless, altering consumers' attitudes, beliefs and knowledge would probably facilitate the acceptance of such policies, and stimulate changes in the political and economical system (Tanner & Kast, 2003).

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