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2 **Lost in Processing? Perceived Healthfulness, Taste and Caloric Content of**  
3 **Whole and Processed Organic Food**

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1 **Abstract**

2 The "organic" claim explicitly informs consumers about the food production method.  
3 Yet, based on this claim, people often infer unrelated food attributes. The current  
4 research examined whether the perceived advantage of organic over conventional  
5 food generalizes across different organic food types. Compared to whole organic  
6 foods, processed organic foods are less available, familiar and prototypical of the  
7 organic food category. In two studies (combined  $N = 258$ ) we investigated how both  
8 organic foods types were perceived in healthfulness, taste and caloric content when  
9 compared to their conventional alternatives. Participants evaluated images of both  
10 whole (e.g., lettuce) and processed organic food exemplars (e.g., pizza), and reported  
11 general evaluations of these food types. The association of these evaluations with  
12 individual difference variables – self-reported knowledge and consumption of organic  
13 food, and environmental concerns – was also examined.

14 Results showed that organically produced whole foods were perceived as  
15 more healthful, tastier and less caloric than those produced conventionally, thus  
16 replicating the well-established halo effect of the organic claim in food evaluation.  
17 The organic advantage was more pronounced among individuals who report being  
18 more knowledgeable about organic food, consume it more frequently, and are more  
19 environmentally concerned. The advantage of the organic claim for processed foods  
20 was less clear. Overall, processed organic (vs. conventional) foods were perceived as  
21 tastier, more healthful (Study 1) or equally healthful (Study 2), but also as more  
22 caloric. We argue that the features of processed food may modulate the impact of the  
23 organic claim, and outline possible research directions to test this assumption.  
24 Uncovering the specific conditions in which food claims bias consumer's perceptions

- 1 and behavior may have important implications for marketing, health and public-policy
- 2 related fields.
- 3 Keywords: organic; whole food; processed food; healthfulness; taste; calories.



1 impact judgments about the consumer of such products. For example, foregoing  
2 exercise is deemed more acceptable when a target person ate organic (vs.  
3 conventional) food (Prada, Rodrigues, & Garrido, 2016; Schuldt & Schwarz, 2010).  
4 The impact of the organic claim on product evaluation has been assessed across  
5 different evaluative dimensions, including sensory proprieties, nutritional judgments  
6 and value-related judgments. For example, when compared to conventional food,  
7 organic food is perceived as having better nutritional qualities (Lee, Shimizu, Kniffin,  
8 & Wansink, 2013; Sörqvist, Haga, Langeborg, et al., 2015), as safer to consume  
9 (Ellison, Duff, Wang, & White, 2016; Hoefkens, Verbeke, Aertsens, Mondelaers, &  
10 Van Camp, 2009), as environmentally friendly (Lazzarini, Zimmermann, Visschers,  
11 & Siegrist, 2016), and even as having more benefits for mental performance  
12 (Sörqvist, Haga, Langeborg, et al., 2015). Not surprisingly, consumers are willing to  
13 pay more for organic products (Lee et al., 2013; Sörqvist, Haga, Langeborg, et al.,  
14 2015; van Doorn & Verhoef, 2011; Wiedmann, Hennigs, Behrens, & Klarmann,  
15 2014), and are more likely to recommend such products to others (e.g., Wiedmann et  
16 al., 2014). Research also shows that when an unfamiliar brand retails an organic (vs.  
17 conventional) product, both the attitude towards that brand and brand trust are  
18 enhanced (Ellison et al., 2016). This bias has been interpreted as reflecting a halo  
19 effect (i.e., the positive influence of a given positive attribute on other unrelated  
20 attributes; Thorndike, 1920; see also Schuldt & Schwarz, 2010).

21         The magnitude of the impact of the organic label on food perception depends  
22 on how such attribute is itself perceived. This implies that the halo effect is only  
23 likely to be observed in participants that believe on the advantage of organic food  
24 over conventional one (e.g., Sörqvist, Marsh, et al., 2016). This idea is supported by  
25 previous research suggesting that individuals with pro-environmental attitudes or

1 behaviors are more prone to such halo effect (e.g., Schuldt & Schwarz, 2010;  
2 Sörqvist, Langeborg, & Marsh, 2016, see also Holmgren, Kabanshi, & Sörqvist,  
3 2017; Sörqvist, Haga, Holmgren, & Hansla, 2015), at least when certain evaluative  
4 dimensions are assessed. For example, participants who report more positive attitudes  
5 towards sustainable consumer behavior (e.g., those who buy eco-friendly products, or  
6 pre-separate waste at source) show a greater taste preference and willingness-to-pay  
7 for an “eco-friendly” (vs. conventional) product (Sörqvist et al., 2013), and judge the  
8 eco-friendly alternative more favorability across evaluative dimensions (e.g., health  
9 benefits; vitamin content; Sörqvist, Haga, Langeborg, et al., 2015). Schuldt and  
10 Hannahan (2013) have also shown that individuals with low environmental concerns  
11 expected organic food to taste worse than conventional food. However, they also  
12 found that ratings of perceived healthfulness were independent of environmental  
13 concerns. On the other hand, Lee et al. (2013) showed that the effect of an organic  
14 claim on perceived calories is weaker for individuals who often engage in pro-  
15 environmental activities, or buy this type of food more often.

16         The main goal of the current paper was to examine whether the impact of  
17 organic claims generalizes to different food types. Specifically, we examined the  
18 perception of whole and processed organic food products, by considering evaluations  
19 of food exemplars and general evaluations of both food types. The evaluations of  
20 organic food types were made by comparing them to their conventional counterparts  
21 in three dimensions – healthfulness, taste and caloric content. In addition to our  
22 primary goal, we also examined the role of individual variables – self-reported  
23 knowledge about organic food, frequency of consumption of organic food, and  
24 environmental concerns – that might be associated with these evaluations (e.g.,  
25 Schuldt & Hannahan, 2013). Finally, we present normative ratings of food exemplars,

1 as they are likely to be useful to researchers investigating the impact of organic claims  
2 on product evaluation.

### 3 **Organic Claims Bias on Healthfulness, Taste and Caloric Content Perception**

4       The evaluative dimensions of healthfulness, taste, and caloric content have  
5 been used in the context of organic food (Schleenbecker & Hamm, 2013), as well as  
6 in other food judgment research, including normative ratings of food images  
7 (Blechert, Meule, Busch, & Ohla, 2014; Charbonnier, van Meer, van der Laan,  
8 Viergever, & Smeets, 2016; Foroni, Pergola, Argiris, & Rumiati, 2013). For instance,  
9 health and taste quality often emerge as the primary reasons for purchasing organic  
10 food (Hughner, McDonagh, Prothero, Shultz, & Stanton, 2007; Pearson, Henryks, &  
11 Jones, 2011; Schifferstein & Oude Ophuis, 1998).

12       Research has consistently shown that organic food is perceived as more  
13 *healthful* than conventional food. This effect is found both when individuals are  
14 judging the general organic food category (e.g., Schuldt & Hannahan, 2013), and  
15 when judging specific food exemplars (e.g., Lazzarini et al., 2016; Prada et al., 2016;  
16 Sörqvist, Haga, Langeborg, et al., 2015). Perceived healthfulness of a food product, in  
17 turn, influences food intake (e.g., Provencher, Polivy, & Herman, 2009).

18       *Taste* seems to override other organic food sensory proprieties such as  
19 appearance (for a review, see Hemmerling, Asioli, & Spiller, 2016). This dimension  
20 has often been assessed by having participants sampling a product (taste perception).  
21 Several studies comparing taste perception between organic and conventional foods  
22 (e.g., Annett, Muralidharan, Boxall, Cash, & Wismer, 2008; Ekelund, Fernqvist, &  
23 Tjärnemo, 2007; Kihlberg, Johansson, Langsrud, & Risvik, 2005; Poelman, Mojet,  
24 Lyon, & Sefa-Dedeh, 2008; Rousseau, 2015; Sörqvist, Haga, Langeborg, et al., 2015;  
25 Tobin, Moane, & Larkin, 2013) report inconsistent findings that do not seem to

1 support a general taste advantage for organic food (for a review, see Bourn &  
2 Prescott, 2002). In fact, results seem to depend on sampling conditions (Pagliarini,  
3 Laureati, & Gaeta, 2013), and on the type of product. For example, yogurt labeled as  
4 organic was considered more flavorful than the conventional one, whereas the  
5 opposite effect emerged for cookies (Lee et al., 2013); and organic orange juice was  
6 preferred over conventional one, but no differences emerged for milk (Fillion &  
7 Arazi, 2002).

8         In line with previous research, in the current studies the taste dimension is  
9 assessed without an actual sampling of the product, namely by asking participants to  
10 anticipate its taste (i.e., expected taste, see Fernqvist & Ekelund, 2014; Piqueras-  
11 Fiszman & Spence, 2015). For example, Schuldt and Hannahan (2013) included a  
12 general taste judgment about organic food (i.e., "compared to other foods, please rate  
13 how tasty organic foods tend to be") and found that organic food is perceived as less  
14 tasty than conventional food. Other authors, in contrast, did not find differences  
15 between organic and conventional food in the expected taste (e.g., Ellison et al., 2016;  
16 Loebnitz & Aschemann-Witzel, 2016).

17         *Perceived caloric content* constitutes a relevant food evaluative dimension that  
18 is strongly correlated with actual caloric content (Charbonnier et al., 2016; Foroni et  
19 al., 2013). Research comparing organic and conventional food have shown that  
20 individuals perceive organic food as having fewer calories than conventional food  
21 (e.g., Lee et al., 2013; Prada et al., 2016; Sörqvist, Haga, Langeborg, et al., 2015). For  
22 example, Schuldt and Schwarz (2010, Experiment 1) tested if an organic claim biased  
23 judgments of a real food product – Oreo cookies – by examining both conventional  
24 and organic versions ("Oreo cookies made with organic flour and sugar"). The  
25 organic (vs. conventional) version was perceived as less caloric and as more

1 appropriate to eat more often than other cookie brands, but only for individuals high  
2 on pro-environmentalism.

3         Healthfulness, taste and caloric content food ratings are not independent. For  
4 example, there is a negative association between healthfulness ratings and caloric  
5 content (Charbonnier et al., 2016). There is also evidence of a negative association  
6 between taste and healthfulness, which presumably reflects an "unhealthy = tasty"  
7 heuristic (e.g., Choi & Springston, 2014; Raghunathan, Naylor, & Hoyer, 2006; cf.  
8 Dubé, Fatemi, Lu, & Hertzler, 2016). Studies have also shown that more caloric food  
9 exemplars are rated as having less palatability (i.e., taste) than less caloric foods  
10 (Blechert et al., 2014).

11         From these findings, it is clear that the advantage of organic over conventional  
12 food is not necessarily consistent across evaluative dimensions. In our view, a  
13 potentially relevant variable to understand these mixed findings is the type of product  
14 under consideration.

### 15 **Type of Product: Whole versus Processed Food**

16         The impact of organic claims on food evaluation has been examined using a  
17 myriad of products. Some studies have focused on fruits and vegetables (e.g., Ekelund  
18 et al., 2007; Poelman et al., 2008; Sörqvist, Haga, Langeborg, et al., 2015), whereas  
19 others have examined both branded (e.g., Schuldt & Schwarz, 2010) or unbranded  
20 (e.g., Lee et al., 2013) processed foods. However, studies comparing different types of  
21 organic products are still scarce. Examining the type of product may help clarify  
22 contradictory findings, because some products may be more representative of the  
23 organic food category than others. For example, using a qualitative approach, Padel  
24 and Foster (2005) found that consumers' first association to organic was fruit and  
25 vegetables, and that this type of products are generally their first (and often the only)

1 experience with buying organic food (see also Pieniak, Aertsens, & Verbeke, 2010).  
2 Converging with this, fruits and vegetables constitute a large share of the organic  
3 market within the EU (Katsarova, 2015). Yet, demand for other products has been  
4 increasing, including animal products (dairy and meat), beverages (mainly wine, but  
5 also coffee and tea), desserts (e.g., ice-cream, cakes, etc.), and ready-to-eat meals  
6 (e.g., pizza, soup, etc.). The organic claim (along with “healthy”) is also becoming  
7 increasingly popular in frozen processed food (International Markets Bureau, 2011a).  
8 Interestingly, the amount of processing of organic foods seems to be negatively  
9 associated with sales, suggesting that the nutritional benefits of consuming organic  
10 ingredients are somehow lost in processing (International Markets Bureau, 2011b).

11         The impact of organic claims on product evaluation may depend on its level of  
12 processing - that is, whole versus processed food. For example, Roininen, Arvola, and  
13 Lähdenmäki (2006) found that the words produced in association to organically  
14 produced food were less positive when the level of processing was higher. Szocs and  
15 Lefebvre (2016) showed that food that was mechanically processed (e.g., blended)  
16 was perceived as less healthful and higher in calories than food that did not undergo  
17 such change, even when its volume is hold constant. Overall, the more processing a  
18 product undergoes, the less natural it is perceived (Evans, de Challemaison, & Cox,  
19 2010). When a food is described as natural, consumers are also likely to infer that it is  
20 organic (Berry, Burton, & Howlett, 2017). Organically farmed food is perceived as  
21 more natural than conventionally farmed food (Rozin, 2005), and individuals report  
22 preference for natural entities, particularly food (Rozin et al., 2004). This preference  
23 has implications for perceived healthfulness, such that processed products are  
24 perceived as more unhealthful (e.g., Dubé et al., 2016; Lazzarini et al., 2016).  
25 Normative data on food images also shows that the level of processing is strongly and

1 positively associated to perceived caloric content (e.g., Foroni et al., 2013), and that  
2 whole foods are perceived as more palatable and rated as more desirable to eat than  
3 processed foods (Blechert et al., 2014). The advantage of whole over processed food  
4 does not extend to all attributes. For example, although fresh fruits are rated as more  
5 healthful, nutritious and tastier than processed fruit (e.g., canned fruit, jam), processed  
6 fruits were rated as more affordable and more convenient (Sabbe, Verbeke, &  
7 Damme, 2008). In a recent study, Machiels and Karnal (2016) manipulated packaging  
8 design to convey distinct levels of processing and naturalness of the same processed  
9 food (orange juice). When the product was perceived as unprocessed, purchase  
10 intention increased, and this effect was mediated by perceived taste.

11         Some authors have already acknowledged the need to examine the impact of  
12 organic claims using different types of products. For instance, Arvola and colleagues  
13 (2008) selected one exemplar of both unprocessed (apples) and processed foods  
14 (ready-to-cook pizza), and tested an organic food purchase intention model. The  
15 authors argued that organic unprocessed foods (i.e., whole organic foods) are more  
16 familiar and that perceiving a high level of processing may be incongruent with the  
17 notion of organic food. To simply put it, if organic foods are construed as natural  
18 (Meyer-Höfer, Nitzko, & Spiller, 2015; Shepherd, Magnusson, & Sjöden, 2005), they  
19 should not be processed to a great extent. In another study, Dean, Raats and Sheperd  
20 (2012) tested the purchase intention of two comparable exemplars of whole (fresh  
21 tomatoes) and processed organic food (tomato sauce). Results showed that perceived  
22 behavioral control only predicts intention to buy the whole food, which was  
23 interpreted as a matter of higher perceived availability of organic fresh foods (see also  
24 Dean, Raats, & Shepherd, 2008). More recently, Ellison and colleagues (2016) found  
25 that the organic claim positively influenced expected taste ratings for the whole food

1 (strawberries), but not for the processed one (cookies). Conversely, the organic claim  
2 positively influenced healthfulness for the processed food, but not for the whole one.  
3 However, Sörqvist, Haga, Langeborg, and colleagues (2015) tested the impact of the  
4 organic claims on similar products (grapes and raisins) and found more favorable  
5 evaluations for the organic alternative, independently of food type. In another study,  
6 Rousseau (2015) found that consumer choice for chocolate was not influenced by the  
7 organic label, arguing that in the case of indulgent food, the association between  
8 organic and healthful is disrupted.

9 Overall, research seems to suggest that the advantage of organic over  
10 conventional food may be contingent on the type of food, and on the evaluative  
11 dimension under consideration. We examined these assumptions in two studies, by  
12 asking participants to evaluate images of food exemplars categorized as either whole  
13 or processed. All exemplars were described as organic and were evaluated by  
14 comparing them to their conventional alternative (following the procedure by Schuldt  
15 & Hannahan, 2013, Study 1). Participants evaluated exemplars in perceived  
16 healthfulness, taste and caloric content. We also assessed participants' general beliefs  
17 regarding whole and processed foods categories in these dimensions. Assessing both  
18 types of measures within-participants allows the direct comparison of their outcomes  
19 which may be relevant to understand previous inconsistent findings. For example,  
20 organic food was perceived as less tasty than conventional food when general  
21 measures were assessed (e.g., Schuldt & Hannahan, 2013), whereas no differences in  
22 expected taste emerged when assessing evaluations of exemplars (Ellison et al.,  
23 2016). Finally, we explored the role of individual differences, namely – self-reported  
24 knowledge about organic food, frequency of consumption of organic food and  
25 environmental concerns – in participants' assessments.

## 1 **Study 1**

2 In this study, we asked participants to evaluate 32 food images depicting  
3 whole and processed food exemplars. All exemplars were described as organic and  
4 were evaluated in comparison to their conventional alternative in three dimensions:  
5 perceived healthfulness, taste and caloric content. We additionally assessed overall  
6 evaluations of whole and processed food types also in these dimensions.

## 7 **Method**

### 8 **Participants and Design**

9 One-hundred-eighty-two Portuguese individuals volunteered to participate in  
10 this experiment (70.9% female,  $M_{age} = 29.65$ ,  $SD = 8.70$ ; 30.8% were students and  
11 59.9% were employed; 76.2% had at least a college degree). Twenty-two participants  
12 reported having a non-conventional diet (e.g., vegetarian, vegan, macrobiotic, etc.)  
13 and were excluded from the initial sample ( $N = 204$ ).

14 Participants evaluated their knowledge about organic food as moderate ( $M =$   
15  $4.14$ ,  $SD = 1.44$ ),  $t(181) = 1.29$ ,  $p = .200$ ,  $d = 0.10$ , and indicated a moderate  
16 frequency of organic food consumption ( $M = 3.80$ ,  $SD = 1.83$ ),  $t(181) = -1.46$ ,  $p =$   
17  $.146$ ,  $d = 0.11$  ( $t$  tests against the scale midpoint: 4).

18 The design included two factors manipulated within-participants: 2 (Food  
19 type: Whole foods; Processed foods) x 3 (Dimension: Healthfulness; Taste; Calories).

### 20 **Materials**

21 Images depicting food exemplars have been described as an alternative to real  
22 food when examining responses to visual food exposure (e.g., Charbonnier et al.,  
23 2016). Our stimulus set ( $n = 32$ ) was selected from a validated food picture database –  
24 Food.Pics (Blechert et al., 2014) that includes both subjective ratings and objective  
25 nutritional information. Half of the images depicted whole foods ( $M_{valence} = 62.21$ ,  $SD$   
26

1 = 7.39;  $M_{\text{palatability}} = 64.88$ ,  $SD = 8.71$ ;  $M_{\text{actual calories}} = 38.19$ ,  $SD = 24.82$ ), and  
2 included fruits (e.g., apples, strawberries, grapes) and vegetables (e.g., lettuce,  
3 zucchini, potatoes). The other half depicted processed foods ( $M_{\text{valence}} = 51.73$ ,  $SD =$   
4  $6.35$ ;  $M_{\text{palatability}} = 55.99$ ,  $SD = 7.93$ ;  $M_{\text{actual calories}} = 288.09$ ,  $SD = 138.03$ ), and  
5 included sweets (e.g., ice-cream, cake, muffin) and meals (e.g., pasta, sandwich,  
6 hamburger). All food exemplars were presented in color against a white background  
7 (image resolution:  $600 \times 450$  pixels, sRGB color format; see Appendix A for the full  
8 description of the stimuli used).

### 9 **Procedure and Measures**

10 Individuals were invited (e.g., institutional email, social network websites) to  
11 collaborate on a Qualtrics web survey about the perception and evaluation of food  
12 images. By clicking on a hyperlink, individuals were directed to a secure webpage in  
13 which they were told that we were conducting a consumer psychology study aiming  
14 to explore how people evaluate different types of food products. They were also  
15 informed about the expected duration of the study (approximately 10 minutes).

16 Participants were told that in their particular case all the food products that  
17 would be presented were *organic*. They were further informed that their task was to  
18 evaluate each image of an organic food product by comparing it to its conventional  
19 counterpart in three dimensions: healthfulness (1 = *Less healthful than conventional* to  
20 7 = *More healthful than conventional*); taste (1 = *Less tasty than conventional* to 7 =  
21 *More tasty than conventional*) and caloric content (1 = *Fewer calories than*  
22 *conventional* to 7 = *More calories than conventional*). Participants were asked to  
23 answer as quickly as possible, although there was no time limit to complete the task.  
24 They were also informed that there were no right or wrong answers, and that all data

1 would be treated anonymously. Participants provided consent to collaborate in the  
2 study by checking the “I agree” option.

3 Before starting their task, participants provided demographic information (age,  
4 gender, education level, occupation). Next, each participant completed 32 trials (i.e.,  
5 the full set of stimuli) presented in random order. In each trial, the food image was  
6 presented on the top center of the screen. To emphasize that the product was organic,  
7 the sentence "This organic product is..." was presented below each image, followed  
8 by the three rating scales (in random order in each trial).

9 The general evaluations about both organic food types were assessed using the  
10 same set of three evaluative dimensions (presented in random order): "In my opinion,  
11 whole organic foods (e.g., fruits, vegetables, etc.) are...", and "In my opinion,  
12 processed organic foods (e.g., sweets, ready-to-eat meals, etc.) are...". These overall  
13 evaluations of each organic food type were presented in different pages.

14 We also assessed individual differences regarding participants' self-reported  
15 knowledge about organic food ("How do you rate your knowledge about organic  
16 food?", 1 = *Very low*; 7 = *Very high*), and their frequency of organic food  
17 consumption ("How often do you eat organic food?", 1 = *Rarely*; 7 = *Frequently*).  
18 Additionally, we asked participants to complete the New Environmental Paradigm  
19 scale (NEP; Dunlap et al., 2000). This scale comprises 15 items about environmental  
20 concerns (e.g., "Humans are seriously abusing the environment"; 1 = *Strongly*  
21 *disagree*, 5 = *Strongly agree*) and presented good reliability in our study ( $\alpha = .70$ ).

22 Finally, participants were also asked about their diet (absence of "specific  
23 diet", macrobiotic, vegetarian, vegan, gluten free, other) and then they were thanked  
24 and debriefed.

25

## Results and Discussion

1 First, we present the descriptive results regarding the evaluation of organic  
 2 versus conventional foods. Second, we examine the impact of food type (whole vs.  
 3 processed) on ratings of both exemplars and general evaluations in the three  
 4 evaluative dimensions. These results are summarized in Table 1. Third, we present  
 5 additional analysis examining associations with individual differences. Finally, we  
 6 summarize the results of the normative ratings of food exemplars.

### 7 **Evaluations of Organic versus Conventional Food**

8 To examine differences in the evaluations of organic food versus conventional  
 9 food, we compared mean ratings against the scale midpoint (a mean score of 4 in a  
 10 given dimension indicates that a given organic food is equated to its conventional  
 11 alternative).<sup>1</sup>

12 **Exemplars.** Mean ratings on each dimension were calculated for each food  
 13 type by averaging the 16 whole foods exemplars and the 16 processed foods  
 14 exemplars (see Table 1, Exemplars Evaluation columns).

15 Table 1

16 Exemplars and General Evaluation of Whole and Processed Organic Foods

	<i>Exemplars Evaluations</i>			<i>General Evaluations</i>			<i>Exemplars vs. General Evaluations</i>
	<i>M</i>	<i>SD</i>	<i>t</i> (181) <sup>1</sup>	<i>M</i>	<i>SD</i>	<i>t</i> (181) <sup>1</sup>	<i>t</i> (181)
Whole Foods							
Healthfulness	6.03 <sup>a</sup>	0.98	28.05 <sup>***</sup>	6.15 <sup>a</sup>	1.36	21.37 <sup>***</sup>	-1.38
Taste	5.62 <sup>a</sup>	1.12	19.45 <sup>***</sup>	5.72 <sup>a</sup>	1.44	16.08 <sup>***</sup>	-1.16
Calories (r)	4.82 <sup>a</sup>	1.03	10.73 <sup>***</sup>	4.87 <sup>a</sup>	1.38	8.51 <sup>***</sup>	< 1
Processed Foods							
Healthfulness	4.39 <sup>b</sup>	1.42	3.75 <sup>***</sup>	4.36 <sup>b</sup>	2.03	2.41 <sup>*</sup>	< 1
Taste	4.88 <sup>b</sup>	1.03	11.50 <sup>***</sup>	4.50 <sup>b</sup>	1.51	4.47 <sup>***</sup>	3.75 <sup>***</sup>
Calories (r)	3.78 <sup>b</sup>	1.19	-2.51 <sup>*</sup>	3.84 <sup>b</sup>	1.61	-1.34	< 1

<sup>1</sup> Because higher scores on the calories dimension represented a negative evaluation of the food items (i.e., more calories than their conventional counterparts), ratings for this dimension were reversed, so that higher scores indicate fewer calories than the conventional counterparts. By doing so, higher scores in all dimension indicate more positive evaluations of each food type.

1 \*\*\*  $p \leq .001$ . \*  $p \leq .050$ .

2 *Note.* <sup>1</sup>Value for  $t$  test = 4 (scale midpoint). (r) = reversed rating (i.e., higher ratings indicate fewer  
3 calories). Different superscripts (<sup>a,b</sup>) indicate differences between whole and processed organic food for  
4 each dimension (exemplars and general evaluations separately).

5 Participants evaluated the exemplars of both whole and processed organic  
6 food as more healthful and tastier than their conventional alternative, all  $p < .001$ .  
7 Whereas whole organic foods were perceived as having fewer calories than  
8 conventional alternatives,  $p < .001$ , processed organic foods were perceived as having  
9 more calories than conventional foods,  $p = .013$ .

10 **General Evaluations.** The general pattern of findings for the general  
11 evaluations replicated that of the evaluation of the exemplars. Whole and processed  
12 organic foods were perceived as more healthful and tastier than their conventional  
13 counterparts, all  $p < .017$ . Whole organic foods were evaluated as having fewer  
14 calories than whole conventional foods,  $p < .001$ , whereas processed organic foods  
15 were seen as equally caloric as their conventional option,  $p = .182$  (see Table 1,  
16 General Evaluation columns).

17 Overall, the organic nature of both whole and processed foods was perceived  
18 as advantageous in healthfulness and taste, for both exemplars and general  
19 evaluations. A similar advantage was observed for calories, but only for whole foods.

## 20 **Evaluations of Whole and Processed Organic Food**

21 **Exemplars.** Results showed that the advantage of organic food over  
22 conventional food in healthfulness,  $t(181) = 15.09$ ,  $p < .001$ ,  $d = 1.12$ , taste,  $t(181) =$   
23  $9.18$ ,  $p < .001$ ,  $d = 0.68$ , and calories,  $t(181) = 8.25$ ,  $p < .001$ ,  $d = 0.61$ , was more  
24 prominent for whole, than for processed food exemplars (see Table 1).

25 **General Evaluations.** As observed for food exemplars, results showed that the  
26 advantage of organic food over conventional food in healthfulness,  $t(181) = 10.68$ ,  $p$

1 < .001,  $d = 0.79$ , taste,  $t(181) = 9.14$ ,  $p < .001$ ,  $d = 0.68$ , and calories,  $t(181) = 6.43$ ,  $p$   
 2 < .001,  $d = 0.48$ , was more prominent for whole than for processed food (see Table  
 3 1).

#### 4 **Additional Analyses**

5 To further examine if the advantage of organic foods was associated with  
 6 individual differences, we explored the role of participants' self-reported knowledge  
 7 about organic food and the frequency of their organic food consumption, as well as  
 8 their environmental concern (see Schuldt & Hannahan, 2013) in the reported  
 9 evaluations (for each dimension and food type). Table 2 presents the correlations  
 10 between the variables.

11 Table 2

12 Correlations Between Organic Self-Reported Knowledge, Organic Frequency  
 13 Consumption, Environmental Concern, Whole and Processed Exemplars and General  
 14 Evaluations

	1	2	3	4	5	6	7	8	9
1. Knowledge	-	.59***	.02	.09	.20**	.03	.08	.06	-.07
2. Consumption	.59***	-	.01	-.07	.20**	-.10	.00	.12	-.11
3. Environmental Concerns	.02	.01	-	-.04	.15*	-.15	-.01	-.01	-.05
4. Exemplars: Healthfulness	.16*	.18*	.28***	-	.12	.70***	.44***	.11	.21**
5. Exemplars: Taste	.24***	.23**	.21**	.78***	-	-.32***	.00	.47***	-.25***
6. Exemplars: Calories (r)	.14	.14	.04	.20**	.05	-	.24***	-.20**	.35***
7. General: Healthfulness	.13	.16*	.17*	.56***	.45***	.04	-	.29***	.61***
8. General: Taste	.37***	.36***	.21**	.52***	.62***	.06	.58***	-	-.01
9. General: Calories (r)	.11	.04	.02	.13	.11	.55***	.19*	.12	-

15 \*\*\*  $p \leq .001$ . \*\*  $p \leq .010$ . \*  $p \leq .050$ .

16 Note. (r) = reversed rating (i.e., higher ratings indicate fewer calories). Correlations for whole foods  
 17 appear below the diagonal, and correlations for processed foods appear above the diagonal.

18 Self-reported knowledge about organic food was positively correlated with  
 19 frequency of consumption of organic food. For whole foods, these two variables, as

1 well as environmental concerns, were positively associated with taste ratings of both  
2 exemplars and general evaluations. In addition, environmental concerns were  
3 positively associated with healthfulness ratings. For processed foods, self-reported  
4 knowledge and frequency of consumption were positively associated with taste  
5 ratings of exemplars, although to a weaker extent. Overall, the results suggest that  
6 individual differences are associated with perceived advantages of organic food over  
7 their conventional alternatives, especially for whole foods.

8       Regarding the association between evaluative dimensions, for whole foods  
9 taste and healthfulness were always positively associated, regardless of being  
10 exemplars or general evaluations. For processed foods, healthfulness was positively  
11 associated with calories for both exemplars and general evaluations, that is, the fewer  
12 the perceived calories, the higher the healthfulness ratings. Moreover, there was a  
13 negative association between calories and taste, but only for exemplars, that is,  
14 exemplars perceived as having more calories were rated higher in taste. Taste and  
15 healthfulness were only positively associated for general evaluations.

16       Interestingly, ratings in the same evaluative dimension were correlated in both  
17 exemplars and general evaluations, for both whole and processed foods suggesting  
18 some convergence between both measures.

### 19 **Normative Ratings**

20       We also present descriptive results by food exemplar according to the three  
21 evaluative dimensions (see Appendix A). Based on the confidence intervals, organic  
22 exemplars were categorized as “less”, “equal” or “more” than conventional ones in  
23 each dimension (Garrido et al., 2016; Prada, Rodrigues, Silva, & Garrido, 2016).<sup>2</sup>

---

<sup>2</sup> When categorized as equal in a given dimension, organic food exemplars were perceived as similar to their conventional counterparts. When categorized as less (vs. more), organic food exemplars were perceived as less (vs. more) healthful, as less (vs. more) tasty, and as having less (vs. more) calories than conventional ones.

1           The entire set of whole organic food exemplars was categorized as more  
2 healthful and tastier than their conventional counterparts. The majority of these  
3 exemplars were also perceived as having fewer calories (87.5%) than their  
4 conventional alternatives. The only exceptions were two food items perceived as  
5 equally caloric when compared to their conventional alternatives (12.5%; i.e., bananas  
6 and potatoes). All processed organic foods were perceived as tastier, and either  
7 equally (56.3%; e.g., croissants) or more healthful (43.8%; e.g., spaghetti with tomato  
8 sauce) than their conventional equivalents. Half of these food items were perceived as  
9 more caloric (50.0%; e.g., hamburger), whereas the remaining were rated as equally  
10 (37.5%; e.g., ham sandwich) or less caloric (12.5%; e.g., muesli bar), than their  
11 conventional counterparts.

12           In short, the results from Study 1 indicated that organic food exemplars - both  
13 whole and processed - were judged as healthier and tastier than their conventional  
14 counterparts. Whole organic food exemplars were perceived as less caloric, whereas  
15 the processed exemplars were perceived as more caloric than the conventional  
16 alternatives. General evaluations of healthfulness, taste and calories of both organic  
17 food types replicated these findings. Taken together, our results suggest a more  
18 positive impact of the organic claim for whole (vs. processed foods) and that the  
19 perceived advantage of this type of foods over conventional ones is associated to  
20 individuals' self-reported knowledge, frequency of consumption and environmental  
21 concerns.

22           However, the stimuli set in the current study was not optimal given that whole  
23 foods included exclusively exemplars of fruits and vegetables, whereas processed  
24 foods included mostly exemplars based on other ingredients (e.g., meat and grain-  
25 based food). Therefore, the difference between subsets was not solely the whole

1 versus processed nature of the exemplars, but overlapped with the food categories  
2 represented.

### 3 **Study 2**

4 The primary goal of the current study was to replicate Study 1 by using stimuli  
5 that are more varied and balanced throughout food types. Specifically, the subset of  
6 whole foods now also includes exemplars such as meat or fish, and the processed  
7 foods subset includes exemplars that are fruit or vegetable-based. Besides expanding  
8 the variety and number of food exemplars (60 vs. 32 as in Study 1), the new stimulus  
9 set always depicts packaged food products to ensure that the most salient difference  
10 between sets is their whole or processed nature.

### 11 **Method**

#### 12 **Participants and Design**

13 Seventy-six Portuguese undergraduate students volunteered to participate in  
14 this experiment (80.3% female;  $M_{\text{age}} = 20.04$ ,  $SD = 3.03$ ) in exchange for partial  
15 course credit. Nine participants reporting having a non-conventional diet were  
16 excluded from the initial sample ( $N = 85$ ).

17 Participants evaluated their knowledge about organic food as moderate ( $M =$   
18  $3.68$ ,  $SD = 1.48$ ),  $t(75) = -1.86$ ,  $p = .067$ ,  $d = .21$ , and reported a moderate frequency  
19 of consumption of this type of food ( $M = 3.63$ ,  $SD = 1.66$ ),  $t(75) = -1.93$ ,  $p = .057$ ,  $d$   
20  $= 0.22$  ( $t$  tests against the scale midpoint: 4).

21 The design included two factors manipulated within-participants: 2 (Food  
22 type: Whole foods; Processed foods) x 3 (Dimension: Healthfulness; Taste; Calories).

#### 23 **Materials**

24 The food images ( $n = 60$ ) were selected from the webpage of an international  
25 grocery retailer that included nutritional information. A panel of three judges

1 discussed and agreed on the familiarity of the food product depicted in each image.  
2 All branding and nutritional information labels were removed using Photoshop, but  
3 the original product identification was kept (e.g., "chocolate chip muffins"). Half of  
4 the images depicted packaged whole foods ( $M_{actual\ calories} = 78.50$ ,  $SD = 62.37$ ) and  
5 included fruits (e.g., apples, grapes,  $n = 10$ ), vegetables (e.g., lettuce, potatoes,  $n =$   
6  $10$ ), and fish and meat (e.g., salmon fillets, raw pork steaks,  $n = 10$ ). The fruit and  
7 vegetables subsets matched the products used in Study 1 (four new products were  
8 added). The remaining images depicted packaged processed foods ( $M_{actual\ calories} =$   
9  $191.23$ ,  $SD = 102.71$ ) and included sweets (e.g., ice-cream, cake,  $n = 10$ ) and meals  
10 (e.g., frozen pasta, pizza,  $n = 10$ ). When selecting meal exemplars, we aimed to  
11 systematically vary the assortment, by including vegetable- and meat-based options  
12 (e.g., "vegetable lasagna" and "cheese and tomato pasta", as well as "beef lasagna"  
13 and "cheese and bacon pasta"). Likewise, the assortment of sweets also included fruit-  
14 based options (e.g., "strawberry sundae" and "lemon sorbet"). A new subset of  
15 processed foods was added to match the type of items included in the whole foods  
16 categories - i.e., fruits, vegetables and meat/fish (e.g., canned fruit, canned vegetable  
17 soup and canned tuna,  $n = 10$ ). All food items were presented in color against a white  
18 background ( $540 \times 540$  pixels, see Appendix B for the full description of the stimuli  
19 used).

## 20 **Procedure and Measures**

21 Participants were invited to the psychology laboratory to collaborate on a  
22 survey about perception and evaluation of food (using Qualtrics). Informed consent,  
23 instructions and measures were identical to Study 1, with the exception of the number  
24 of trials (60 in Study 2). Each session took on average 15 minutes.

25

## **Results and Discussion**

1 Data were analyzed as in Study 1: evaluation of organic versus conventional  
 2 foods; impact of food type on ratings of both exemplars and general evaluations in the  
 3 three evaluative dimensions; additional analysis examining whether the evaluation of  
 4 organic foods was associated with individual differences; and normative ratings of  
 5 food exemplars.

## 6 Evaluations of Organic versus Conventional Food

7 **Exemplars.** Mean ratings on each dimension were calculated for each food  
 8 type (i.e., average of 30 whole foods and 30 processed foods exemplars). As in Study  
 9 1, higher scores correspond to more positive evaluations in the three dimensions (i.e.,  
 10 more healthfulness, tastier and fewer calories) and the advantage of organic food over  
 11 conventional food was assessed by comparing mean ratings against the scale midpoint  
 12 (see Table 3, Exemplars Evaluation columns).

13 Table 3

14 Exemplars and General Evaluation of Whole and Processed Organic Foods

	<i>Exemplars Evaluations</i>			<i>General Evaluations</i>			<i>Exemplars vs. General Evaluations</i>
	<i>M</i>	<i>SD</i>	<i>t(75)<sup>1</sup></i>	<i>M</i>	<i>SD</i>	<i>t(75)<sup>1</sup></i>	<i>t(75)</i>
Whole Foods							
Healthfulness	5.57 <sup>a</sup>	1.01	13.55 <sup>***</sup>	6.01 <sup>a</sup>	1.06	16.49 <sup>***</sup>	-3.44 <sup>***</sup>
Taste	5.19 <sup>a</sup>	0.99	10.46 <sup>***</sup>	5.49 <sup>a</sup>	1.37	9.45 <sup>***</sup>	-1.92
Calories (r)	4.70 <sup>a</sup>	0.86	7.07 <sup>***</sup>	4.95 <sup>a</sup>	1.18	7.02 <sup>***</sup>	-2.21 <sup>*</sup>
Processed Foods							
Healthfulness	3.99 <sup>b</sup>	1.38	-0.05	3.95 <sup>b</sup>	1.74	-0.26	< 1
Taste	4.70 <sup>b</sup>	0.87	6.99 <sup>***</sup>	4.26 <sup>b</sup>	1.54	1.49	2.67 <sup>**</sup>
Calories (r)	3.64 <sup>b</sup>	1.19	-2.67 <sup>**</sup>	3.53 <sup>b</sup>	1.44	-2.87 <sup>***</sup>	< 1

15 \*\*\*  $p \leq .001$ . \*\*  $p \leq .010$ . \*  $p \leq .050$ .

16 Note. <sup>1</sup>Value for *t* test = 4 (scale midpoint). (r) = reversed rating (i.e., higher ratings indicate fewer  
 17 calories). Different superscripts (<sup>a,b</sup>) indicate differences between whole and processed organic food for  
 18 each dimension (exemplars and general evaluations separately).

19 Similar to Study 1, participants evaluated the exemplars of whole organic  
 20 foods as more healthful, as tastier and as having fewer calories than their conventional

1 counterparts, all  $p < .001$ . However, for processed food the only advantage of organic  
2 over conventional food occurred at the taste level,  $p < .001$ . Processed organic  
3 exemplars were rated as having more calories than their conventional alternatives,  $p$   
4  $= .009$ , and as equally healthful,  $t < 1$ .

5 **General Evaluations.** The pattern found for general evaluations of whole  
6 organic foods replicates results from Study 1, i.e., more healthful, tastier and less  
7 caloric than their conventional counterparts, all  $p < .001$ . Processed organic foods  
8 were rated as being as healthful and tasty as conventional food, both  $p > .141$ , and as  
9 having higher caloric content,  $p = .005$  (see Table 3, General Evaluation columns).

#### 10 **Evaluations of Whole and Processed Organic Food**

11 **Exemplars.** Results showed that the advantage of organic food over  
12 conventional food in healthfulness,  $t(75) = 9.79$ ,  $p < .001$ ,  $d = 1.12$ , taste,  $t(75) = 4.27$ ,  
13  $p < .001$ ,  $d = 0.49$ , and calories,  $t(75) = 6.21$ ,  $p < .001$ ,  $d = .71$ , was more prominent  
14 in whole than in processed food (see Table 3).

15 **General Evaluations.** Results showed again that the advantage of organic over  
16 conventional food in healthfulness,  $t(75) = 9.28$ ,  $p < .001$ ,  $d = 1.06$ , taste,  $t(75) = 5.59$ ,  
17  $p < .001$ ,  $d = 0.64$ , and calories  $t(75) = 6.23$ ,  $p < .001$ ,  $d = 0.71$ , was more prominent  
18 in whole than in processed food (see Table 3).

#### 19 **Additional Analyses**

20 As in Study 1, we examined the associations between individual variables and  
21 in the reported evaluations (for each dimension and food type, see Table 4).

22 Table 4

23 Correlations Between Organic Self-Reported Knowledge, Organic Frequency

24 Consumption, Environmental Concern, Whole and Processed Exemplars and General

25 Indexes

	1	2	3	4	5	6	7	8	9
1. Knowledge	-	.51***	-.11	.04	.22	-.07	-.14	.04	-.17
2. Consumption	.51***	-	-.05	-.04	.08	-.07	.02	.25*	-.04
3. Environmental Concerns	-.11	-.05	-	-.25*	.03	-.17	.09	.22	-.11
4. Exemplars: Healthfulness	.32**	.25*	.08	-	-.12	.92***	.46***	.00	.59***
5. Exemplars: Taste	.29**	.22	.09	.84***	-	-.22	-.14	.41**	-.14
6. Exemplars: Calories (r)	.09	.14	.27*	.58***	.35**	-	.53***	.07	.67***
7. General: Healthfulness	.24*	.12	.25*	.43***	.38***	.22	-	.32**	.69***
8. General: Taste	.27*	.31**	.11	.36***	.38***	.06	.49***	-	.06
9. General: Calories (r)	-.02	.01	.27*	.17	.02	.56***	.27**	-.03	-

1 \*\*\*  $p \leq .001$ . \*\*  $p \leq .010$ . \*  $p \leq .050$ .

2 *Note.* (r) = reversed rating (i.e., higher ratings indicate fewer calories). Correlations for whole foods  
3 appear below the diagonal, and correlations for processed foods appear above the diagonal.

4 Self-reported knowledge about organic food was positively correlated with  
5 frequency of consumption of organic food. For whole foods, self-reported knowledge  
6 was also positively associated with healthfulness and taste ratings of both exemplars  
7 and general evaluations, whereas frequency of consumption was positively associated  
8 with healthfulness ratings of exemplars, and with general taste ratings. Environmental  
9 concerns were positively associated with calories ratings of both exemplars and  
10 general evaluations, and with general healthfulness evaluations.

11 Regarding the association between individual differences and ratings of  
12 processed foods, results only show a positive association between frequency of  
13 consumption and general taste ratings, and a negative association between  
14 environmental concerns and healthfulness ratings of exemplars (i.e., participants with  
15 higher environmental concerns perceived the exemplars as less healthful).

16 Within evaluative dimensions, for whole foods healthfulness and taste were  
17 always positively associated, as well as healthfulness and calories, for both exemplars  
18 and general evaluations. A positive association between taste and calories was only  
19 found for exemplars, such that foods rated as lower the calories were rated as higher

1 in taste. For processed foods, healthfulness and taste were only positively associated  
2 for general evaluations, and healthfulness and calories were positively associated for  
3 both exemplars and general evaluations.

4 As in Study 1, ratings in the same evaluative dimension were correlated in  
5 both exemplars and general evaluations, for both whole and processed foods  
6 suggesting some convergence between measures.

### 7 **Normative Ratings**

8 The pattern regarding whole foods was similar to Study 1, such that all  
9 exemplars were categorized as more healthful and as tastier than conventional food  
10 (see Appendix B). The majority of whole organic foods was also perceived as having  
11 fewer calories than the conventional alternative (86.7%). Processed organic foods  
12 were categorized as equally (66.7%; e.g., boxed chicken wrap) or more healthful  
13 (30.0%; e.g., strawberry jam) than their conventional alternative. These food items  
14 were also categorized as tastier (90.0%; chocolate chip muffins), and the remaining  
15 (e.g., instant mashed potatoes) as equally tasty to conventional ones. Processed  
16 organic food exemplars were categorized as equally (46.7%; e.g., canned tropical fruit  
17 salad) or as higher in calories (46.7%; chilled pepperoni pizza) than conventional  
18 alternatives. The exceptions were two exemplars categorized as having fewer calories  
19 (i.e., canned mashed peas and lemon sorbet).

### 20 **General Discussion**

21 Claims presented on food labels - such as “organic” - influence how  
22 consumers perceive and behave towards a given food product (for a review, see  
23 Fernqvist & Ekelund, 2014). Several studies have shown that people generally  
24 perceive organic food as superior to food produced according to conventional  
25 methods. Given that consumers describe processed products as containing additives

1 and other artificial ingredients, as having lower nutritional quality and as unhealthful  
2 (Ares et al., 2016), a high level of food processing seems to be incongruent with the  
3 idea of organic food (e.g., Arvola et al., 2008). In this research, we investigated  
4 whether the organic food advantage (vs. conventional food) generalizes across whole  
5 and processed food types. Specifically, we examined the perceived healthfulness,  
6 taste and caloric content of organic (vs. conventional) whole and processed food,  
7 using exemplars and general evaluations.

8         Results from two studies consistently showed that whole organic foods are  
9 perceived as more healthful, tastier and as having lower caloric content than their  
10 conventional counterparts. This is the case for both evaluations of food exemplars and  
11 general evaluations of whole organic foods. These findings are consistent with a halo  
12 effect (Thorndike, 1920) that has been reported in the context of food evaluation (for  
13 a review, see Chandon & Wansink, 2007). Specifically, based on the organic attribute,  
14 individuals infer other proprieties of the food product (e.g., Schuldt & Schwarz,  
15 2010). In our studies, this halo effect was systematically observed with two different  
16 measures (exemplars and general evaluations) and across all the evaluative  
17 dimensions examined. Results regarding perceived caloric content are noteworthy,  
18 considering that the whole food exemplars were objectively low in calories, which  
19 could have constrained the impact of the organic claim. Moreover, our results suggest  
20 that the perceived advantage of whole (vs. processed) organic food seems to be more  
21 pronounced among individuals that report to be more knowledgeable about organic  
22 food, consume organic food more frequently and are more environmentally  
23 concerned.

24         The advantage of the organic claim for processed foods is less clear. Overall,  
25 organic (vs. conventional) processed foods were perceived as tastier, as more (Study

1) or equally healthful (Study 2), but as more caloric than conventional alternatives. The few studies examining the impact of organic claims according to food type do not report systematic effects across evaluative dimensions. For example, Ellison and colleagues (2015) reported the impact of the organic claim on taste evaluations for a whole food product (but not for a processed food product), and on healthfulness evaluations for a processed food product (but not for a whole food product). However, in that study only a single exemplar of each food type was used (strawberries and cookies), whereas in our studies we included a broader set of exemplars (16 or 30 exemplars of each food type). Nonetheless, in our studies, the organic claim was introduced simply by referring to the food products as organic. This generic claim is usually applied to whole foods, but not to processed foods. It is possible that the claim needs to be more specific in the case of processed foods, for instance focusing on the production method of the ingredients they include. For example, in Schuldt and Schwarz's (2010) study, Oreo cookies were not described as fully organic, but rather as made with organic flour and organic sugar. Future studies should explore this possibility.

The impact of the organic claim for whole foods seems to be robust. Therefore, we think it is worthwhile to further explore which features of processed food modulate the impact of such claim. In comparison to whole organic foods, processed organic foods are less available, less familiar and less prototypical of the organic food category. Previous studies focusing on the influence of the organic claim on processed food exemplars (yogurt, cookies and potato chips), suggest that the effect may depend on the specifics of the product and on the evaluative dimensions at stake (e.g., Lee et al., 2013). In our view, these differences may be related to the extent of product processing, namely weaker effects of the organic claim may occur

1 for highly processed products. The discrepancies found in the evaluations of  
2 processed foods between our two studies seem to support this idea. A main difference  
3 between our studies is that in Study 2 all food products were packaged. Packaging  
4 may be perceived as counteracting the sustainable nature of organic products, and  
5 thus have a detrimental impact on consumer choice, at least for organic fruits and  
6 vegetables (van Herpen, Immink, & van den Puttelaar, 2016, Study 1). In our studies,  
7 packaging did not seem to affect the evaluation of whole foods (e.g., presenting  
8 apples in a plastic bag did not change how apples were perceived in terms of  
9 healthfulness, taste and caloric content). Still, for processed food exemplars,  
10 packaging may have increased the perception of their level of processing. For  
11 example, in Study 1 a pasta dish was presented on a plate, whereas Study 2 presented  
12 a box of a frozen pasta meal. Therefore, it is possible that participants perceived the  
13 latter as more processed than the former, and were less likely to be influenced by the  
14 organic claim.

15 In future studies, instead of using a dichotomous categorization of food type  
16 (whole vs. processed; Blechert et al., 2014), it would be interesting to measure (e.g.,  
17 Berry et al., 2017; Mouta, de Sá, Menezes, & Melo, 2016) or manipulate the extent to  
18 which food products are processed. For example, some products are likely to be  
19 perceived as “totally processed” (pizza) whereas other are just “partially processed”  
20 (tomato sauce, Dean et al., 2008). Even when keeping the product constant (pizza), it  
21 is possible to manipulate the degree of processing (e.g., frozen pizza to be baked at  
22 home vs. a ready-to-eat pizza supplied by a delivery service, Thøgersen & Bredahl,  
23 2006). The degree of processing can also be manipulated through visual or textual  
24 cues displayed in food packaging (e.g., Machiels & Karnal, 2016). Another possibility  
25 is to use food classification systems, such as the one proposed by Monteiro and

1 colleagues (2010), in which food products range from unprocessed or minimally  
2 processed (e.g., pasteurization and wrapping to preserve or increase food  
3 accessibility, such as milk and fresh meat), to ultra-processed (e.g., ready to eat  
4 products with little or no preparation, such as desserts and frozen meals).  
5 Alternatively, considering that individuals hold expectations regarding the naturalness  
6 of different product types (Smith, Barratt, & Selsøe, 2015), researchers can use  
7 stimuli (e.g., images of food) pre-tested regarding their perceived level of  
8 transformation (see Foroni et al., 2013). Moreover, future studies could also assess  
9 beliefs regarding whole and processed foods (e.g., European Food Information  
10 Council, 2016), as well as regarding organic food, and examine if such individual  
11 differences modulate the impact of the food production claims. It would also be  
12 interesting to replicate our work manipulating food type between-participants, to  
13 make the comparison between whole and processed foods less salient. Doing so  
14 would discard the potential contribution of task demands to the current findings.

15         The main contribution of our work relates to the systematic examination of the  
16 role played by food type on organic food evaluation. Overall, our findings show that  
17 the perceived advantages of organic over conventional food are stronger for whole  
18 than for processed foods, and are more prominent in individuals that report being  
19 more knowledgeable, consume organic food more often, and are environmentally  
20 concerned. By providing subjective norms of a diverse set of food exemplars, the  
21 current work also offers practical implications for researchers interested in  
22 investigating the impact of organic claims on food perception and behavior. From a  
23 marketing standpoint, and according to our data, it seems that the organic claim for  
24 processed foods may not be particularly advantageous in promoting positive  
25 inferences about the product. In the case of whole foods, however, the organic claim

1 may lead consumers to infer positive proprieties unrelated with the food production  
2 method. In other words, the organic claim may serve as an extra cue for a more  
3 positive perception (and, hopefully, choice) of products such as fruits and vegetables.  
4

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