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How does mothers' mood matter on their choice of organic food? Controlled eye-tracking study

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ABSTRACT

Organic foods have been argued to be highly beneficial for human health and environmental sustainability. Interest in organic food consumption has been steadily growing. In practice, music and sounds of nature have widely been utilized in the food retailing industry to evoke customers and influence their sustainable product purchases. The present research explored the effects of subjective and objective knowledge, mood states, connectedness to nature (CtN), and visual attention to the organic logo on organic purchase by a controlled eye-tracking study. Sixty women, all with children participated in the study. Findings revealed that objective knowledge, subjective knowledge, and visual attention on organic labels posed significant effects on organic purchases. However, no such effects of mood states and connectedness to nature have been observed. Theoretical and managerial implications of the findings are discussed.

1. Introduction

Consumers have been trying to avoid artificial ingredients and additives, chemicals, and genetically modified organisms (GMO). Consequently, demand for organic food has been increasing dramatically (Bi et al., 2015; Olson, 2017) and the concept of organic nutrition has become more popular in the food industry (Basha, Mason, Shamsudin, Hussain, & Salem, 2015). 2.8 million producers have implemented organic farming practices in 186 countries (103 of them have their organic regulations) on 71.5 million hectares of land in 2018. In the same year, the total revenue of retail sales stemmed from organic farming amounted to approximately 97 billion euros while organically managed land represented just 1.5% of the total utilized farmland (Willer, 2020).

The increase in organic food production has led to increased competition in the market. Both researchers and practitioners began to investigate factors affecting consumers' demand for organic foods. Recently, subjective knowledge (SK) and objective knowledge (OK) (Peschel, Grebitus, Steiner, & Veeman, 2016), emotional wellbeing (Kenny, 2015), and connectedness to nature (CtN) (Spendrup, Hunter, & Isgren, 2016) were identified as critical factors affecting environmentally sustainable product choices. Further, researchers have documented that consumers' mood states (Gardner, 2014) and prior knowledge about organic production affect their attitudes towards organic food (Gracia & de Magistris, 2007; Zepeda & Deal, 2009). Most of the consumer research on organic food consumption relied on subjective data obtained by the survey method. Due to the inherent limitations of the survey method, it is not easy to objectively evaluate which factors are truly influential in consumer decision processes. Indeed, the use of objective data obtained through innovative research methods can provide additional insights in understanding consumers' sustainable food purchasing decisions.

Several neurophysiological and physiological methods have been applied in scientific studies to explore mental and cognitive processes in the unconscious minds of consumers (Halpern, 1967; Kuan, Zhong, & Chau, 2014). Among others, eye-tracking technology is a non-invasive, simple, and innovative technique that has been widely used to measure respondents' processing of visual stimuli, their visual attention (VA) to the given object, and the identification of their non-conscious cognitive processes (Mitterer-Daltoé, Queiroz, & Fiszman, 2014; Samant & Seo, 2016; McLaughlin, Bond, Hughes, McConnell, & McFadden, 2017). By investigating several eyes and gaze processes, it is possible to understand the social cognition of the subject (Baars & Gage, 2010, p. 127–156). As emotions influence message processing, cognitive responses, and

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decision making (Morin, 2011), it is important to apply eye-tracking measurements to understand the relationship between consumers' cognitive activity, value comparison, gazing behavior, VA, and choice decision (Jantathai, Danner, Joechl, & Dürrschmid, 2013; Olmsted-Hawala, Holland, & Quach, 2014; Gere et al., 2016; Samant & Seo, 2016; Helmert, Symmank, Pannasch, & Rohm, 2017). Identifying the relationship between consumers' VA and decision-making may help to better understand their organic product preferences. Accordingly, the research method of this study included both questionnaires and the eye-tracking technique.

Just like in many cultures, food shopping for households is made by housewives in Turkey. Hence, in this study, the organic food buying behavior of Turkish women with children was investigated. The present study has five main objectives: (1) to examine the role of SK and OK on mothers' organic food purchase decision (OPD); (2) to identify the influence of mood states and CtN on mothers' OPD; (3) to identify whether VA is an indication of OPD (4) to draw managerial implications for retails and producers of organic products to contribute better sensory marketing applications; (5) to identify possible research gaps and impactful factors for future researchers. This is the first empirical study that jointly models the impact of SK, OK mood states, CtN, and VA on mothers' organic food purchase decisions made under laboratory conditions with the control group by eliminating the confounding factors.

In the following sections, we review the literature on the effect of mood states and CtN on organic food purchase, the role of SK, OK, and VA. Next, we describe our research model, data collection methodology, analyses, and findings. Finally, we summarize the study outcomes, the contribution of these outcomes to organic food producers and the retail industry and we outline potential areas for future research.

2. Literature review and hypotheses development

2.1. Women and organic food consumption

Socio-demographic characteristics of consumers may help to understand the motivations behind their consumption patterns (Lin & Hsu, 2015). Several researchers examined the connection between preferences toward organic products, consumer demographics, and household variables (Magnusson, Arvola, Koivisto Hursti, Åberg, & Sjödén, 2001; Justin & Jyoti, 2012). In general, females tend to have more nutritional knowledge and follow healthier diet patterns than men (Dickson-Spillmann & Siegrist, 2010). Women have significantly more health-related worries because of health concerns and complaints than men (Indregard, Ihlebæk, & Eriksen, 2013). Married women were reported to be more likely to have environmental concerns (Ergen, Bozkurt, & Giray, 2014) and prefer organically produced food than unmarried females (Aygen, 2012). Several studies show that women have more positive attitudes toward organic products (Magnusson et al., 2001; Doorn & Verhoef, 2011) in consequence of the belief that organics have more nutritional intensity and have a fundamentally more positive constructive role in the human body (Dragomir, 2015) than conventional food (Lea & Worsley, 2005). Thompson and Kidwell (1998) revealed that having children has a direct effect on the choice of organic food. Not only women with children but also some of the breastfeeding and pregnant women stated that they trust organic or ecological meats as they found them more natural (Muñoz, Fontalba-Navas, Arrebola, & Larrea-Killinger, 2019). All these studies show that women with children are an important consumer group in studies on organic foods. Therefore, females with children were selected as the target group in the current research.

2.2. Effects of SK and OK on organic food purchase

Knowledge might cause a change in attitudes and beliefs (Aertsens, 2011). Ajzen (2005; p.134) stated the role of knowledge to be a background factor influencing intentions and behaviors in the Theory of Planned Behavior (TBP). Brucks (1985) identified three categories of consumer knowledge: OK, SK, and prior experience, and stated that SK was associated with better predictions of decision making. A positive correlation was reported between the level of prior knowledge about organics and consumption level (Kapuge, 2016). Both types of knowledge have direct (Costa-Font, Gil, & Traill, 2008) and indirect effects on attitudes (Sun, Huang, & Chu, 2015) and behaviors (Jin & Han, 2014).

OK (i.e., knowledge about production and certification processes) influences attitudes through beliefs and perceived knowledge (Pal, 2012). A study conducted in Turkey by Atılgan (2014) on milk and dairy products revealed that SK positively correlated with attitudes towards those products while OK had a negative relation with attitudes. The level of SK has been claimed as one of the more important factors that identify consumers' current knowledge as well as their self-confidence (Chiou, 1998) which is a predictor of perceived behavioral control (Nuttavuthisit & Thøgersen, 2017), and consumption frequency of food products (Gámbaro, Ellis, & Prieto, 2013). Peschel et al. (2016) indicated that SK was the major driver of environmentally sustainable product preference and Verbeke (2008) stressed that SK has a better predictive role on food consumption. Higher levels of SK cause more positive attitudes towards organics (Pal, 2012; Hsu, Chang, & Lin, 2016), and more positive intentions to buy those products (Hsu et al., 2016) as well as an increase in frequency and level of purchase (organic vegetables) (Pieniak, Aertsens, & Verbeke, 2010), the willingness to pay (WTP) premiums for organic products (Mesías Díaz, Martínez-Carrasco Pleite, & Paz, 2012) and the hazard perception (Onel, Onel, Mukherjee, & Mukherjee, 2016). Based on this discussion, we anticipate both SK and OK to influence organic food purchase decisions:

H1: *Subjective Knowledge significantly influences organic food purchase.*
H2: *Objective Knowledge significantly influences organic food purchase.*

2.3. Effects of mood and connectedness to nature (CtN) on organic food purchase

The importance of mood in decision-making processes and its impact on decision outcomes have been clearly mentioned in the literature (Enam, Konduri, Pinjari, & Eluru, 2018). Mood has an influence on emotion (Jiang, King, & Prinyawiwatkul, 2014). It does not always control (Thayer, 1989, p.15), but nevertheless influences behavior (Herz, 2010, p.93). Ajzen (2005, p.134) listed emotions as background factors that impact intentions and behaviors. What is more, there has been a positive correlation between positive mood state and choice of nutrient-rich and healthy foods since it affects "*distal, abstract construal*" which induces long-term considerations related to the advantages of foods on people's health. On the contrary, negative mood states cause hedonic reward-seeking and result in the choice of indulgent foods (Gardner, 2014). The mood-congruence hypothesis suggests that "*an affective state increases the accessibility of semantic content that has a similar affective tone*" (Janiszewski & Wyer, 2014). Therefore, we propose the following hypothesis:

H3: *Positive mood state significantly influences organic food purchase.*

The "*biophilia hypothesis*" asserts that individuals have a biological need to unite with and "feel connected to the broader natural world" (Mayer & Frantz, 2004). Schultz (2002, p.67) defined connectedness as "*the extent to which an individual includes nature within his/her cognitive representation of self*". Nature sounds lead to the feeling of CtN. Organic products and nature sounds are assumed to be well harmonized (congruent), and this belief increases the desire for organic purchase. Spendrup et al. (2016) found that being exposed to nature sounds has a significant and positive effect on WTP organic foods, but not on their climate-friendly counterparts. They concluded that natural sounds have the power to represent nature and encourage consumers' sustainable product purchase intentions. Zelenski, Dopko, and Capaldi (2015)

reported that "*nature can produce psychologically meaningful effects and CtN may facilitate prosocial and environmentally sustainable behaviors*". Based on this theoretical background, we propose the following hypothesis:

H4: *Connectedness to Nature significantly influences organic food purchase.*

2.4. Eye-tracking, gaze analysis and organic food purchase

Eye-tracking has recently been used as a tool in marketing and advertising research in combination with qualitative and quantitative techniques (Mitterer-Daltoé et al., 2014). The technique provides useful output to understand respondents' search strategies, to identify which elements of the given visual stimuli draw attention and which elements are being focused (Sharafi, Soh, & Guéhéneuc, 2015; McLaughlin et al., 2017). Since VA is the precondition for obtaining information (Van Loo et al., 2015), it enables higher-order cognitive functions (LaBerge, 1995). The association between consumers' choices (decision making) and VA has been documented (Rihn, Khachatryan, Campbell, Hall, & Behe, 2016). Visual attraction, visit duration and fixation count were positively associated with a choice decision (Jantathai et al., 2013). Yet, consumers were reported to pay more attention and dedicate more time to the labels of preferred choices (Samant & Seo, 2016). "Attention Capture and Transfer in Advertising" (AC-TEA) model explains the relationship by bottom-up and top-down processing of VA to a stimulus. The model puts the attention to add elements in the center, and exogenous and endogenous processes are determinants of the attention capture (Pieters & Wedel, 2004). Bottom-up and top-down processing occur simultaneously, interacting with each other. While the basic characteristics of stimuli (shape, size, color) are processed with bottom-up processing, the experiences, motivations, and expectations of the individual are processed with top-down processing. (Feldman, 2015, p.118). Therefore, analyzing factors such as mood, level of knowledge, and interaction with nature together with VA can provide a better understanding of consumers' decision-making processes.

VA can be monitored by gaze analysis and saccades (Van Loo et al., 2015). Saccades are the rapid eye movements that direct our fovea ("*a small, central patch of each retina that has a very high density of visual receptors, hence the highest visual resolution*") (Baars & Gage, 2010, p.47) at targets of interest (Garaas, Nieuwenhuis, & Pomplun, 2008; Meeter, Van der Stigchel, & Theeuwes, 2010) to capture detailed information from the dynamic visual environment. The direction of gaze plays a crucial role in the identification of one's attention and intention (Grynszpan, Martin, & Fossati, 2017). A close relationship has been established between food choice and gazing behavior (Gere et al., 2016). Typically, the following indicators are measured for gaze analysis:

- Total fixation duration (TFD): Duration of all fixations within an area of interest (AOI).
- Time to first fixation (TTFF): Time from the start of the display until the test participant fixates on the AOI for the first time.
- Visit Count (VC): Number of visits within an AOI.
- Fixation Count (FC): Number of times the participant fixates on an AOI.
- Visit Duration (VD): Time in seconds until the first click is made within an AOI.

The first seen item, fixation duration, number of fixations, number of visits, and visit duration on an AOI have been identified as key determinants of choice decision (Armel, Beaumel, & Rangel, 2008). During cognitive processing, an increase of the length of total fixation duration, number of fixations, and visit count reflect subjects' higher interest (Helmert et al., 2017) and engagement (Olmsted-Hawala et al., 2014). Accordingly, we propose the following hypotheses reflecting the relationship between VA and organic purchase:

H5: *Fixation duration on organic area significantly affects organic purchase.*
H6: *Time to the first fixation on organic area significantly affects organic purchase.*
H7: *Visit Count on organic area significantly affects organic purchase.*
H8: *Fixation count on organic area significantly affects organic purchase.*
H9: *Visit duration on organic area significantly affects organic purchase.*
H10: *Fixation count on organic price significantly affects organic purchase.*

In order to test these hypotheses, we conducted experimental laboratory research. Fig. 1 presents the conceptual model of the study.

3. Material and methods

3.1. Participants and procedure

60 volunteer female participants with children (children aged between 0 and 18) were recruited by ThinkNeuro® Laboratory with telephone interviews. The telephone interview contained a filtering question. Candidates were asked "*which type of food do you never want to buy or consume?*" (e.g., Field crops, Junk food, Private labels, Organically labelled products, Food with GMOs, Greenhouse products, Processed foods). The main exclusion answer was that they "*never wanted to buy or consume organics*". Confirmation that the participants did not have any food allergies was obtained during the interview. To eliminate any selection and confounding biases, candidates were evaluated carefully for the following criteria (Nijs, 2010; Quarto, Blasi, Pallesen, Bertolino, & Brattico, 2014): both the experiment and the control group consisted of 30 healthy women with normal Body Mass Index (BMI) scores, aged between 20 and 45 with children (aged 0–18), in B, C1 and C2 Socio-Economic Classes, not a vegetarian (or vegan), not musicians, no chronic diseases such as cancer, diabetes mellitus, eating disorder, no visual impairment, no eye surgery in a year, no hearing deficits, no mental disorders, no movement disorders, no medication therapy and psychiatric disorder.

Food deprivation has been reported to be a critical factor in increasing the attractiveness of food stimuli (Sailer & Ackerley, 2017), therefore, participants were asked not to have eaten 2 h prior to their visit to the laboratory. Before the experiments, participants were asked to complete the Positive and Negative Affect Schedule (PANAS) and CtN scales (items of the scales were shown in a randomized order) through an online survey. After the completion of the pre-surveys, sandwiches (with cheese and vegetables) were offered 20 min before the experiment.

To induce a positive mood associated with nature, participants were exposed to birdsong of "Turdus Merula L." (Black Bird) (Hedblom, Heyman, Antonsson, & Gunnarsson, 2014) which is identified with its singing in the same frequency, and its restorative perceptions have been catalogued to be "high" (Ratcliffe, Gatersleben, Sowden, 2016). In a considerable number of studies, mood induction has been achieved through stimuli such as video, film clips, and music (Kučera & Haviger, 2012; Cardi, Leppanen, & Treasure, 2015; Le, 2019). Bradley and Lang (2007) highlighted that imagination, anticipation, action, and perception are the classifications of induction in affective reactions. However, according to self-reports of respondents, music has been identified as the best method to augment mood (Thayer, 1989, p. 23). Another key fact to remember is that acoustic stimuli could be more insistent compared to visual stimuli in relation to perceptual affective reactions. More importantly, it may not be easy to determine whether a person is looking at an image or closing one's eyes (Bradley & Lang, 2000), especially in retail settings. Music influences individuals' emotional states (Lundqvist, Carlsson, Hilmersson, & Juslin, 2009), stress level (Annerstedt et al., 2013), moods, tension, energy level, and perception of visual stimuli (Turley & Milliman, 2000). Similarly, bird sound's "relaxing and restorative" effects (Ratcliffe et al., 2013; Ratcliffe et al., 2016) have

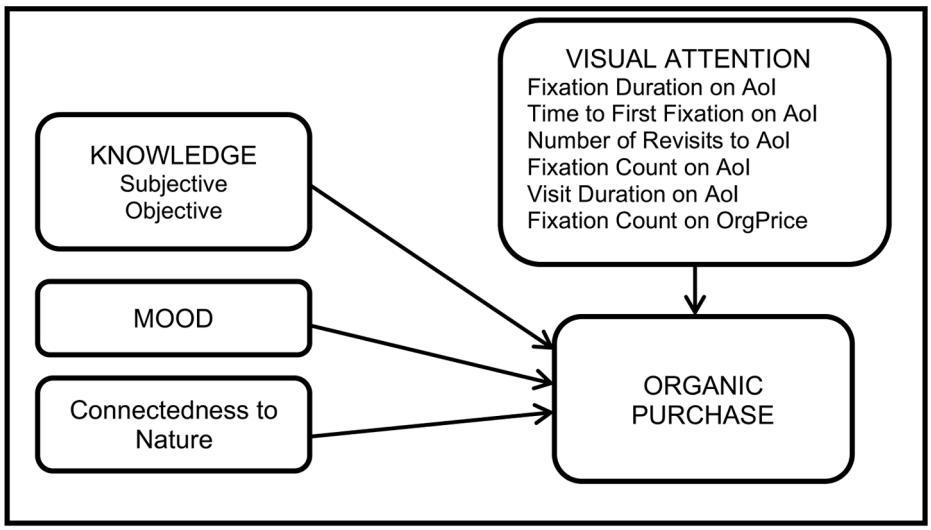


Fig. 1. Conceptual Research Model.

been associated with the feeling of "personal connectedness to nature" and an increased level of personal interactions with nature (Ratcliffe et al., 2013) which are linked to the benefits of promoting well-being (Depledge, Stone, & Bird, 2011). Accordingly, the experiment group was exposed to "*Black Bird*" songs 20 min prior to the experiment and during the experiment, while participants of the control group stayed in a silent room.

Experiments were conducted in a sound and odor-free room. As the study aims to provide real-life purchasing situations a $25 budget was provided to each respondent and real market prices were applied for each product ($1 = 3TL). Participants were also rewarded with $10 Multinet Tickets for their participation. During the experiments, they were asked to make their decisions in accordance with their daily routine behaviors. After control trials, three sections of the experiment were completed; participants were asked to fill out online PANAS, CtN, SK, and OK scales and additional demographic questions after completing the choice experiments.

3.2. Measures and data collection

The eye-tracking methodology was applied to better understand the complex processes of purchase behavior, the relation between eye movements, VA, and decision. Primary data was obtained through choice experiments; since it allows for the investigation of the main attributes of the product that determine the product utility. After the completion of the experiment, the data related to decision duration time (time to the first click), visit count, fixation count, time to the first fixation, and total fixation duration were obtained. Participants were asked to fill out an online questionnaire concerning their OK, SK, mood, CtN, and demographic profile before and after the experiment.

"OK" and "SK" scales were completed after the experiment, in order not to cause any confounding that might direct respondents to organic purchase. The aim of these scales was to measure respondents' actual and perceived knowledge. OK was assessed via the 4-item "true" of "false" scale developed by Aertsens (2011). Aertsens (2011) added a certainty part to the scale so that it allows the measurement of participants' degree of certainty while they chose if the statement is "true" or "false". The degree of certainty was measured via a 5-point Likert scale (1 refers to "uncertain", 5 refers to "certain"). Participants' total OK scores were calculated according to consideration of the correctness of each question and the degree of certainty specified by each participant. A correct answer with the highest certainty (5) was scored as 9 points, a wrong answer with the highest certainty (5) was scored as zero (0) points for each of the statements. The total OK score of each respondent was calculated by summing up the scores obtained from the 4 statements.

Participants' SK scores were measured by a 7-point Likert scale (ranging from 1 = totally disagree, to 7 = totally agree) consisting of 3-items (Aertsens, 2011). The 3 statements are: "*In comparison with an average person I know a lot about organic vegetables*", "*People who know me, consider me an expert in the field of organic vegetables*" and "*I know a lot about how to judge the quality of organic vegetables*". The total SK score of each respondent was calculated by summing up each score from the 3 statements and was scored between 3 and 21.

Respondents' connectedness to nature was explored through pre-and post-CtN scale scores. CtN scale is an affective 14-item scale developed by Mayer and Frantz (2004). Items were rated on a seven-point Likert Scale (1 = Strongly disagree, 3 = Neutral, 7 = Strongly agree). Higher scores represent a greater strength of connectedness with nature. The scale aims to identify respondents' sense of unity, kinship, and belonging to nature (Mayer & Frantz, 2004) and has a very high test–retest reliability (r = 0.79) and internal consistency (α = 0.84). In our study, the CtN scale was applied with the "at the present moment" time frame. For example, participants were asked to rate the extent to which they had experienced each statement like, "Right now, I am feeling a sense of oneness with the natural world around me".

Mood was assessed before and after the experiment through Positive and Negative Affect Schedule: The PANAS Scales developed by Watson, Clark, and Tellegen (1988) measures positive and negative affect. PANAS 5-point Likert scale (1 = not at all, 3 = moderately, 5 = extremely) includes 20 items (10 positive and 10 negative adjectives). The scale has been accepted as the gold standard for the evaluation of affective states (Ripper et al., 2018). Participants were asked to rate the extent to which they had experienced each emotion within a specified timeframe, this study applied timeframe was 'right now'.

3.3. Content selection and eye-tracking stimuli

In this research, we preferred to use non-packaged vegetables and fruits to eliminate brand-related biases since strong brand familiarity manipulates the attitudes and trust level itself, and high brand equity has an impact on the labeling effect (Larceneux, Benoit-Moreau, & Renaudin, 2012; Ellison, Duff, Wang, & White, 2016). Fruits and vegetables were chosen among the most commonly purchased fruits and vegetables in Turkey. All images used in the experiment were obtained from organic stores and usual greengrocers. As an exogenous attention transfer may take place if the surface size of an element differs from one to the other, the size of two counterparts in each experiment set the size

of the logos and the images were kept identical (Pieters & Wedel, 2004).

The experiment had three choice sets for five different products. The first section named "PLAIN" included organic and conventional samples of visuals of 5 different fruits and vegetables (banana, apple, strawberry, carrot, tomato) and participants were asked to select one of the products displayed on the screen. Neither logo nor price information was provided at this stage. The use of plain images in this section aimed to understand whether individuals can distinguish organic products from others in daily life. The second section named "WITH LOGO" included the same fruits and vegetables with logos, and participants were asked to choose one of the displayed products. Each product was displayed with an organic logo and a conventional logo. Organic and conventional logos are shown in Fig. 2. Finally, in the third section named "WITH LOGO & PRICE" fruits and vegetables were displayed with logos and current market prices.

All alternatives were displayed in a randomized order in each choice set. Conventional products were presented with a logo having the same color and shape properties as the official organic logo since saliency and color of logos have been reported to be an impactful confounding factor on reward processing (Linder et al., 2010). Fig. 3 exhibits the choice sets used in the study.

The experiment was conducted in laboratory conditions (at the ThinkNeuro® Laboratory) to eliminate distractions (e.g., people, noise), to control conditions (e.g., shelf design) impacting consumers' attention, through Tobii T120 Technology, by presenting the set of visual stimuli to subjects and recording eye movements on a 17-inch monitor. The pixel quality of stimuli was set at 1280x1024 using Adobe Flash software.

The eye-tracking technique was used to examine respondents' search strategies, to identify which elements of the given visual stimulus first draw respondents' attention and which elements are focused on the most. We measured Time to First Fixation (TTFF), Total Fixation Duration (TFD), Fixation Count (FC), Visit Count (VC), Visit Duration (VD) within the AOI. In addition, we also constructed "heat maps" reflecting participants' search strategies and their percentage of fixation duration in a given AOI. Increased level of fixation is represented with more intense colors in the heat map (Fig. 4). Heat maps were also evaluated to ensure whether participants paid attention to the given stimulus before making their decision.

Pictures of organic and conventional fruits and vegetables were of the same size to eliminate the distracter factors (Clement, Kristensen, & Grønhaug, 2013). Both groups were displayed in the same unit (for example, 3 organic and conventional strawberries, 2 organic and conventional apples, 1 banana, etc.) in a randomized order. Objects were displayed on a white background. Both organic and conventional products had an identical AOI. The sampling rate was set at 120 Hz (Attention Toll 5.2 software). The experiment started with a 9-point calibration task, and then 8 practice trials were completed to familiarize subjects with the task. Respondents sat on a chair that was 60–70 cm distant from the screen. Visuals remained till participants make their choice (till the first click). After each stimulus, there was a resting period with a black screen (with no cross) lasting 5 s.

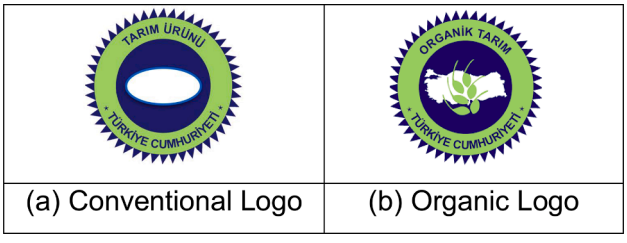


Fig. 2. Conventional (a) and Organic (b) Logos Used in the Study.

4. Data analyses and results

Before testing the research hypotheses, we made some preliminary analyses to check the positive mood inducement manipulation, and to control the dimensionality and reliability of scales used in the study. Scale dimensionality was examined by exploratory factor analyses of each measurement scale. Scale reliability was assessed by internal consistency using Cronbach's alpha coefficient.

4.1. Mood inducement manipulation check

Positive mood inducement manipulation was controlled by PANAS-P (Positive) scale. Principal components analysis suggested a single factor for the PANAS-P scale, which explained 50% of the total variance (KMO = 0.83; Bartlett's Test $p < 0.001$). Two items (Alert and Excited) were removed due to low factor loadings. The remaining scale items loaded heavily (from 0.73 to 0.54) on the unrotated factor. Cronbach's alpha coefficient was calculated as 0.79. We, therefore, decided that the measure has adequate internal consistency and computed a composite variable by averaging the responses on the eight items for use in the mood inducement manipulation check. We compared PANAS-P mean scores of experiment and control groups by using independent samples *t*-test. The PANAS-P mean score in the experiment group was 4.39 (SD = 0.35) whereas it was 3.97 (SD = 0.59) in the control group. There was a significant difference between the mean scores, ($t(58) = 3.325$, $p < 0.01$). Respondents exposed to bird sound indicated a higher positive mood score than other respondents who were not exposed to bird sound. Therefore, we concluded that positive mood inducement manipulation was successful.

4.2. Connectedness to nature-CtN

Principal components analysis suggested a single factor for the CtN scale, which explained 62% of the total variance (KMO = 0.83; Bartlett's Test $p < 0.001$). Scale items loaded heavily (from 0.84 to 0.50) on the unrotated factor. Cronbach's alpha coefficient was calculated as 0.82. We computed a composite variable by averaging the responses on the thirteen items for use in further analyses. The CtN mean score in the experiment group was 5.64 (SD = 1.46) whereas it was 4.86 (SD = 1.10) in the control group. There was a significant difference between the mean scores, ($t_{(58)} = 2.37$, $p < 0.05$). Respondents exposed to bird sound indicated a higher CtN score than other respondents who were not exposed to bird sound.

4.3. SK and OK

Principal components analysis suggested a single factor for the SK scale, which explained 82% of the total variance (KMO = 0.70; Bartlett's Test $p < 0.001$). Scale items loaded heavily (from 0.94 to 0.87) on the unrotated factor. Cronbach's alpha coefficient was calculated as 0.88. We computed a composite variable by averaging the responses on the three items. Average SK scores were very similar in both groups; SK's mean score in the experiment group was 4.60 (SD = 1.19) whereas it was 4.55 (SD = 1.41) in the control group. There was no statistically significant difference between the SK scores of the groups ($t_{(58)} = 0.132$ $p = 0.896$).

Since the OK of the participants was assessed by a 4-item "true" or "false" test, scale dimensionality and reliability were not calculated. Participants' total OK scores were weighted by multiplying consideration of the correctness of each answer with the degree of certainty specified by each participant. Weighted OK scores were very similar in both groups; OK weighted score in the experiment group was 24.03 (SD = 7.14) whereas it was 23.03 (SD = 8.07) in the control group. There was no statistically significant difference between the OK scores of the two groups ($t_{(58)} = 0.508$ $p = 0.613$). In general, it is observed that the participants in the experiment group gave responses at a lower degree of

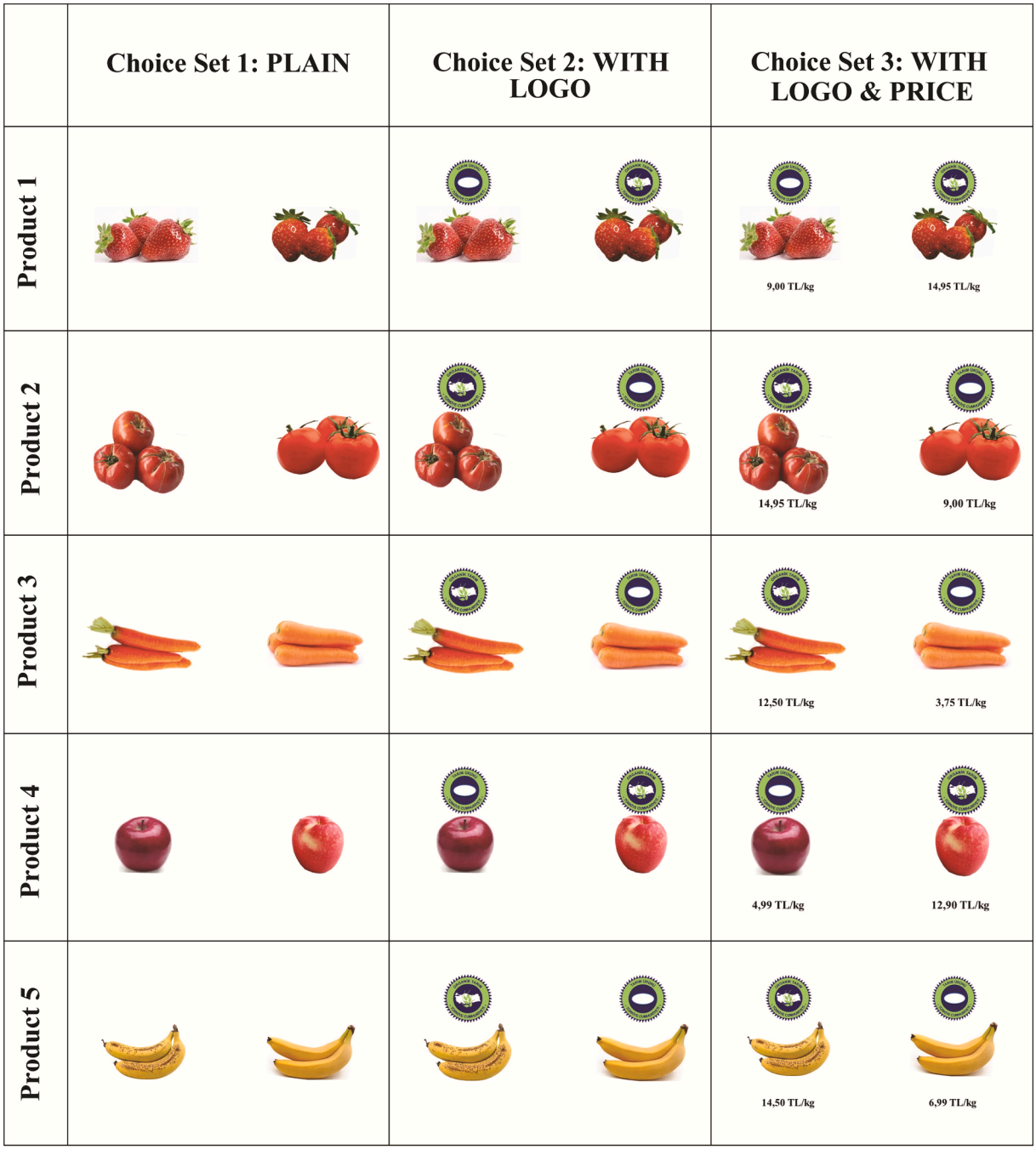


Fig. 3. Choice Sets Used in the Study.

certainty than the control group.

4.4. Eye-tracking data

The organic logo and the organic product itself were determined as the areas of interest (AOI). TTFF, TFD, average VD on APIs were calculated as milliseconds through Tobii T120. The number of revisits and fixation count on the organic area and organic price were also measured. Fig. 4 shows an illustration of an original choice set, and a heat map computed by the software as an example of the visualization of the focus (red zone) of participants' interests. These measures were integrated with the other measures used in the study. Finally, the dependent variable of the study was measured as the total number of organic products chosen by each participant. The mean scores, standard deviations, and interrelations of study variables are presented in Table 1.

As seen in Table 1, correlations among all variables reveal that SK, OK and fixation duration on organic product areas are significantly positively related to total organic buy decisions (total organic purchases in 3 sections) ($r = 0.394$, $r = 0.266$, $r = 0.254$ respectively; $p < 0.005$) while Average VD on Organic Price is significantly negatively correlated with organic buy ($r = -0.297$). Further, connectedness to nature and SK is found to be significantly positively correlated with positive mood states ($r = 0.370$, $r = 0.379$ respectively; $p < 0.001$). In addition, SK has a significantly positive correlation with connectedness to nature ($r = 0.461$; $p < 0.001$). Finally, OK is also found to have a significantly positive correlation with fixation duration on organic product area ($r = 0.259$; $p < 0.005$).

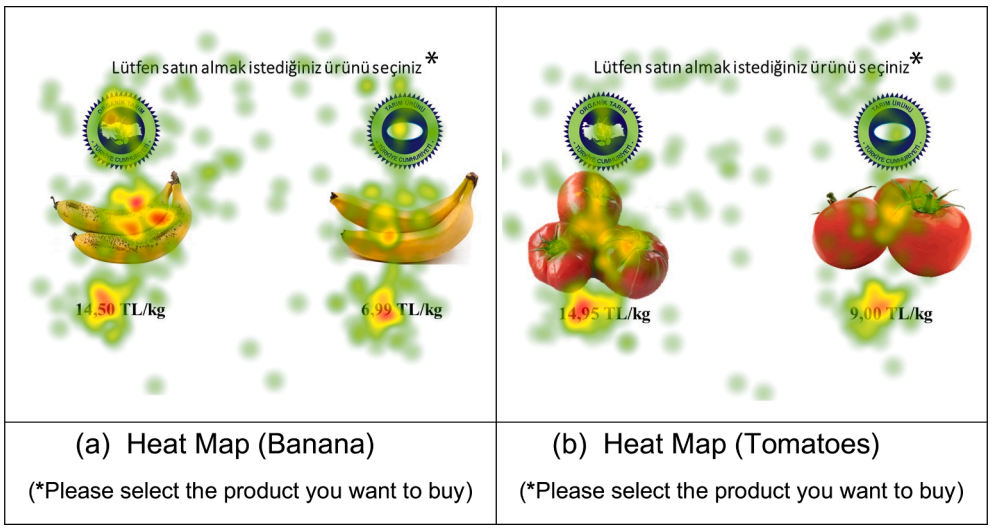


Fig. 4. Illustration of a Heat Map Calculated Based on the Eye-tracking Data.

Table 1
Means, Standard Deviations, and Interrelations of Study Variables.

	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12
1. Total Organic Buy	8.91	3.76												
2. SK	4.56	1.30	0.451**											
3. OK	23.74	7.62	0.277*	0.010										
4. Panas_P	4.17	0.53	0.102	0.379**	−0.021									
5. CtN	5.21	1.35	0.108	0.461**	−0.013	0.370**								
6. TTFF on Organic Area	0.49	0.20	0.218	0.127	0.124	−0.032	0.128							
7. TFD on Organic Area	0.88	0.39	0.303*	0.077	0.298*	0.006	−0.083	0.170						
8. FC on Organic Area	2.58	0.82	−0.190	−0.121	0.165	−0.061	0.070	0.154	0.570**					
9. VC on Organic Area	1.61	0.38	−0.034	−0.086	0.135	−0.090	0.054	0.187	0.640**	0.846**				
10. Average VD on Organic Area	0.34	0.09	−0.314*	−0.138	−0.040	−0.021	−0.158	−0.023	0.159	0.443**	0.113			
11. Fixation Count on Organic Price (FCPrice)	4.09	1.27	−0.213	−0.271*	0.199	−0.133	−0.205	0.235	0.676**	0.813**	0.773**	0.299*		
12. Visit Count on Organic Price (VCPrice)	1.75	0.37	−0.047	−0.227	0.197	−0.166	−0.100	0.303*	0.669**	0.773**	0.853**	0.185	0.854**	
13. Average VD on Organic Price (VDPrice)	0.54	0.14	−0.297*	−0.212	−0.024	−0.069	−0.289*	0.177	0.206	0.352**	0.282*	0.348**	0.540**	0.198

** Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

4.5. Hypotheses tests

Research hypotheses were tested by multiple regression analysis[1]. We performed a hierarchical regression analysis in three steps. Table 2 shows the results of the hierarchical regression analysis where self-reported measures and eye-tracking measures predict the total number of organic buy decisions in the experiment. According to regression analysis results, self-reported measures and eye-tracking measures are significant predictors of organic product purchase decisions.

The hierarchical regression analysis was performed in three steps. In the first step (Model 1) SK, OK, Panas_P and CtN were included as predictors of total organic buy. Results indicate that SK exerts a significantly positive effect ($\beta = .515$ $p < 0.001$) while OK has a marginally significant positive effect on organic purchase decisions ($\beta = .266$ $p = 0.026$). These findings support H1 and H2. However, positive mood (H3) and connectedness to nature (H4) exerted non-significant negative effects on organic purchase decisions ($\beta = -.049$ $p = 0.702$ and $\beta = -.113$ $p = 0.401$ respectively). We could not find enough evidence to support H3 and H4. The first regression model accounts for 28.9% of the total variance in organic purchase decisions.

In the second step, after the inclusion of VA measures (TTFF, FD, FC, VC, and VD on organic area), an additional 18.7% of the total variance is accounted by the predictors and the amount of explained variance in organic purchase decision increased by to an overall level of 47.6% ($p <$

[1] Two extreme cases were excluded to improve the predictive capability of the model.

Table 2
Regression Analysis with Total Organic Buy Decisions as Dependent Variable.

	Predictors	Std. Beta	t	Sig.	R^2	F	Durbin-Watson
Model 1	**(Constant)**		0.57	0.571	0.289	5.376**	2.134
	SK	0.515	3.82	0.000			
	OK	0.266	2.297	0.026			
	Panas_P	−0.049	−0.384	0.702			
	CtN	−0.113	−0.846	0.401			
Model 2	**(Constant)**		1.186	0.241	0.476	4.846**	
	SK	0.347	2.681	**0.010**			
	OK	0.179	1.596	0.117			
	Panas_P	−0.048	−0.412	0.682			
	CtN	−0.015	−0.117	0.907			
	TTFF on Organic Area	0.127	1.174	0.246			
	FD on Organic Area	0.431	2.846	**0.006**			
	Organic Area FC	−0.364	−1.364	0.179			
	Organic Area VC	−0.003	−0.01	0.992			
	Organic Area VD	−0.154	−1.056	0.296			
Model 3	**(Constant)**		1.695	0.097	0.58	5.184**	
	SK	0.223	1.707	**0.095**			
	OK	0.169	1.623	0.111			
	Panas_P	−0.01	−0.087	0.931			
	CtN	−0.162	−1.234	0.223			
	TTFF on Organic Area	0.205	1.77	**0.084**			
	FD on Organic Area	0.639	3.986	**0.000**			
	Organic Area FC	0.127	0.425	0.673			
	Organic Area VC	−0.066	−0.221	0.826			
	Organic Area VD	−0.229	−1.574	0.122			
	Organic Price FC	−0.818	−2.431	**0.019**			
	Organic Price VC	0.161	0.491	0.626			
	Organic Price VD	0.014	0.081	0.936			

0.001). Fixation duration on the organic area has a significantly positive effect on organic purchase ($\beta = .431$ $p = 0.006$), supporting H5. Contrary to our expectations we could not find enough evidence to support H6, H7, H8, and H9. Further, the effect of OK is diluted and became nonsignificant in this step.

In the third step, VA measures on organic price were also included in the model. In this step, Fixation Duration on Organic Area ($\beta = .639$ $p < 0.001$), and Organic Price FC ($\beta = -.818$ $p < 0.019$) were found to exert significant effects on total organic buy decisions. This finding supported H10 proposing a significant effect of FC on organic price. As the respondent fixates more on the organic price, his/her probability of buying the organic product significantly decreased. In addition, while the effect of SK is diminished ($\beta = .223$ $p = 0.095$); TTFF on Organic Area ($\beta = .205$ $p = 0.084$) exerted a marginally significant positive effect on total organic buy. Inclusion of measures of attention to organic price resulted in an additional 10.4% explanation power and the amount of explained variance in organic purchase decision increased to an overall level of 58% ($p < 0.001$). These findings are discussed in the next section.

5. Conclusion and discussion

This study examined the effects of various self-reported variables in conjunction with eye-tracking data on organic purchase decisions. The research model of the study provides a unique mix of the factors influencing the organic purchase. Research data were analyzed to reveal the role of SK and OK related to organic products and the effect of the nature sounds on consumers' mood states and the level of CtN. The study investigated the impact of SK and OK on organic purchases in a representative Turkish sample. One of the objectives of this research was to investigate whether positive mood states and CtN have an impact on organic product purchase. Mood inducement procedures (MIPs) were applied through exposure to the bird sound. Eye-tracking provided valuable data through heat mapping to ensure that participants viewed given stimuli while they were making their purchase decision. Finally, several visual attention indicators were analyzed to see their effects on organic purchase.

AC-TEA model centralizes the attention to ad elements and exogenous and endogenous processes are listed as major determinants of the attention capture (Pieters & Wedel, 2004) which also differentiate choice. We found that fixation duration on organic area exerted a significantly positive effect on organic purchase; and this finding conforms with previous research (Van der Laan, Hooge, De Ridder, Viergever, & Smeets, 2015; Samant & Seo, 2016). When the viewers have a longer gaze at the organic area, their likelihood to buy the product increases.

High price levels of organic products have been reported as a chief deterrent factor in consumer demand for organic foods in several studies (Magnusson et al., 2001; Lea & Worsley, 2005; Doorn & Verhoef, 2011). Investigations into the organic consumption patterns of Turkish consumers have shown that consumers are very price-sensitive and have limited 'organic' awareness (Ersun and Arslan, 2011). Our data shows the number of times the participant fixates (FC) on organic price has significant but negative effects on organic purchases.

Teng and Wang (2015) and Müller and Gaus (2015) showed the role of prior knowledge of organic food and labels as it develops trust and impacts attitudes towards organic foods and their purchase. In line with the previous studies, our findings revealed that there were positive and statically significant correlations between the level of knowledge (both subjective and objective) and organic purchase. Moreover, our findings suggest that SK has a stronger effect on organic purchase decisions, compared to OK. One explanation for this finding is that knowledge and awareness are important to differentiate organic products from their counterparts (Yiridoe, Bonti-Ankomah, & Martin, 2005) and the level of self-rated knowledge represents the confidence as it relies upon past experiences of organic products.

According to the findings, the experiment group's organic purchase mean scores were slightly higher than the control groups' organic

purchase. Even though previous studies indicated a positive correlation between the positive mood states and healthy food choices (Gardner, 2014), we did not find any significant direct effects of positive mood states on organic purchase. A possible reason for this outcome may be the importance of knowledge in organic product selection (Spendrup et al., 2016). Food preferences are mainly shaped by post-ingestive effects (Araujo de, 2011, p.264) by means of the outcome of previous consumption experiences. Even though participants wanted to prefer a healthier choice among two, they needed to identify an organic logo, benefits of organic products, and their other attributes. In addition, the products in the choice sets were not as diverse as in previous studies (e.g., chocolate vs apple).

Organic products and CtN are well harmonized (congruent) which may increase the desire for organic purchase (Zelenski et al., 2015). However, our findings revealed that there was no statically significant effect of CtN scores on organic purchases. As predicted by the "*biophilia hypothesis*", when a higher level of CtN is achieved, a person may want to unite with nature and make choices in parallel with it. However, it may not have worked that way in the laboratory conditions. In other words, the emotions triggered by the color and the smell of the product in natural living conditions may be totally different than in the laboratory.

To sum up, our findings contribute to the consumer behavior literature in the context of organic product choices, by linking visual attention and consumer decision-making processes. Results of this study suggest that subjective knowledge is a stronger determinant of organic product purchase decisions, compared to objective knowledge. Grounded on visual attention theory, outcomes of this experimental study document the disposition of the very often supposed but rarely investigated relationship between visual attention and organic product choice. Our findings indicate that consideration of visual attention can increase the predictive power of the established models on consumer decision-making. Results of eye movement, fixation, and duration examinations revealed significant theoretical and practical implications by providing illuminating explanations on organic product purchase decisions.

6. Implications

The research model of this study provides a unique mix of the factors influencing the organic purchase. The main outcomes of this study will be recommended to the management teams of organic firms' who will be encouraged to apply them to the creation of strategic marketing strategies, managers in the retail sector who will use them to attain high-value organic product consumers, and scientists who study the role of stimulus regarding food-related cognitive processes.

This study shows the relation between SK, OK, and organic purchases of women. Based on the results, any effort to increase consumers' knowledge and awareness may have an influence on their organic purchase. To this extent, marketing communications including the main features of organic farming and organic products, benefits of organic fruits and vegetable consumption covering mass media and promotional activities like spreading handouts and leaflets especially in the areas close to the "mother & baby aisles" in the supermarkets may be beneficial to improve awareness, knowledge, attention, and organic purchases. What is more, it will be an important approach to create and enhance product consumption experience by letting consumers taste and experience the product at the point of purchase. When all these promotional activities are handled, the conditions need to be established to make people feel connected to nature.

Given that it is a price-sensitive market, pricing at a level that will generate a competitive advantage and applying for price promotions may be strategic approaches that will attract the attention of consumers. On the other hand, when the difficulties experienced in accessing organic products are evaluated, arranging the sections where organic products are sold in an interesting way and creating environments where consumers can spend more time could be beneficial in the purchase decision. Finally, consumers should be surveyed to gain insight into their perception of the product and its organic attributes.

7. Limitations and future research directions

This study is limited to households in a metropolitan city (Istanbul). Purposefully selected 60 volunteer female participants with children (Aged between 0 and 18) were recruited. Even though the study participants reflect the recent SES distribution of Turkey, study findings may not be generalized across different populations. Therefore, future studies employing random samples may provide better insights into organic consumption. Participants' health conditions and some other characteristics were controlled to create identical groups and not to cause any confounding factors (experiment and control). Auditory stimuli were applied to induce participants' moods and CtN while other stimulants like odorants, haptics, and tastes have not been tested.

In the present study, the participants' previous organic consumption habits were not known before the study, but possible research on group comparison between regular organic food consumers and consumers tending to reject organic products can provide important information in terms of their personality, values, diseases, presence of children, lifestyle, health-related concerns and level of knowledge.

Although eye-tracking was used in this study to better understand consumer behavior, in future studies eye-tracking may be combined with fNIR, fMRI, or EEG to have more effective results to identify the brain-level effects of being exposed to specific stimuli. fNIR, fMRI, and EEG would provide important insights into the brain activity related to personality and personal values.

Finally, as an alternative to utilizing bird sound to induce a positive mood and CtN, some other stimulants (e.g., visuals, smells, and haptics) may similarly create stronger mood induction and a more vivid connectedness to nature. Harmoniously using several stimuli that can activate multiple senses for mood induction will also be a crucial step to creating innovative marketing strategies especially for the FMCG sector. Hence, it is worth further examining the effects of using audio-visual stimuli (IAPS). Moreover, future studies may focus on comparing the repercussions of visual, auditory, and olfactory stimuli on consumers' arousal and choice. Last but not the least, more realistic stimulus designs can be developed in future studies by placing the products in the context of a store display, rather than showing the images of the products on a screen.

CRediT authorship contribution statement

Caner Giray: Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Belma Yon:** Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Umit Alniacik:** Validation, Supervision, Project administration, Methodology, Formal analysis, Conceptualization. **Yener Girisken:** Investigation, Resources, Validation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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