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RESEARCH ARTICLE

How do consumer perceptions of "local" production benefits influence their visual attention to state marketing programs?

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Abstract
With increasing market potential due to consumer interest in locally sourced foods, state marketing promotional campaigns are becoming increasingly popular. We quantify consumers' perceptions of local production benefits and assess the impact of Florida's state agricultural promotional campaign on consumer preferences for and visual attention to fruit-producing plants. A rating-based experiment and eye tracking measures were integrated to investigate the relationship between consumers' perceived benefits of local production, purchase likelihood, and visual attention. Local economy benefits were perceived as the most beneficial (compared to environmental or product quality benefits) with participants' demographics influencing their perceptions of those benefits. Visual attention to the agricultural promotional campaign logo increased consumers' purchase likelihood if they perceived locally grown plants as benefiting the local economy. The local production attribute had a positive impact even though consumers who became familiar with the visual stimulus (after repetitive exposures) spent relatively less time visually attending to the campaign logo. [EconLit citations: M3].

1 | INTRODUCTION

Consumers' preferences and demand for perishable goods (fruits, vegetables, and plants) are considerably affected by product origin claims (Loureiro & Hine, 2002; Onken, Bernard, & Pesek Jr, 2011; Yue & Tong, 2009). A substantial factor influencing consumer interest in product origins is the local foods movement which has increased demand for local goods. For instance, in 2008, U.S. local food sales were valued at $4.8 billion and accounted for 1.6% of all U.S. agricultural products (Johnson, Aussenberg, & Cowan, 2013). Research has linked local and in-state origin promotions to increased willingness-to-pay (WTP) for fresh produce often due to the perceived benefits of local origins (Cembalo et al., 2015; Loureiro & Hine, 2002; Onken et al., 2011; Yue & Tong, 2009).

State governments are taking advantage of the increasing demand for local products by using state agricultural marketing programs to encourage consumption of products produced in-state. Prior to 2000, less than half of the states in the United States had agricultural promotional campaigns (APCs) but by 2010 they existed in all 50 states (Onken & Bernard, 2010). APCs promote products produced in-state to increase consumers' demand, WTP, and welfare (Bosworth, Deevon, & Curtis, 2014; Carpio & Isengildina-Massa, 2015; Crenwelge, 2016; Davis, 2012; Hughes & Isengildina-Massa, 2015; Onken & Bernard, 2010; Ruth & Rumble, 2016). For example, residents in Colorado are willing to pay premiums for Colorado-grown potatoes (Loureiro & Hine, 2002), Minnesotans for Minnesota-grown tomatoes (Yue & Tong, 2009), New Jersey residents for Jersey fresh strawberry preserves (Onken et al., 2011), and South Carolina residents for Certified South Carolina restaurant items (Xie, Isengildina-Massa, & Carpio, 2014). Additionally, Florida residents are more likely to select strawberries labeled Fresh from Florida (Ruth & Rumble, 2016). Not all state marketing programs include ornamental plants.[1] Recently, Florida's Fresh from Florida campaign expanded its commodity scope to include ornamental plants (FDACS, 2014) which could benefit Florida's economy since it is the second largest ornamental plant producer in the U.S. Florida's total industry sales in 2015 were estimated at $10.7 billion, including $2.8 billion for nursery producers, $4.4 billion for landscape service firms, $1.3 billion for horticultural retailers, $1.0 billion for wholesalers, and $1.2 billion for allied firms (Hodges, Hall, Palma, & Khachatryan, 2015a; Hodges, Khachatryan, Palma, & Hall, 2015b; Hodges, Khachatryan, Rahmani, & Court, 2016).

Several factors may hinder the effectiveness of state APCs. First, consumer definitions and perceptions of local production vary substantially (Campbell, Khachatryan, Behe, Dennis, & Hall, 2014; Campbell, Khachatryan, Behe, Dennis, & Hall, 2015). For example, consumers often use the terms "local," "organic," "eco-friendly," and "sustainable" interchangeably (Campbell et al., 2014; Campbell et al., 2015). This has several negative implications for producers and marketers including the potential for producers to divert market share from one another (Campbell et al., 2014). Additionally, consumers may be confused about what they are actually purchasing resulting in dissatisfaction which can negatively impact future demand. A second challenge to APCs is that the promotions must be noticed by consumers in order to influence their decisions (Behe et al., 2013; Orquin & Mueller Loose, 2013). Megick et al. (2012) noted that poor promotions and labeling (in addition to availability issues) are major purchasing barriers for local products. This is particularly challenging since consumers only attend to 2% of their visual field at a given moment in time (Balcombe, Fraser, & McSorley, 2015). The limited visual attention field (and span) means that consumers selectively view relevant information while ignoring irrelevant information to reduce their cognitive load during the decision making process (Vidal et al., 2013). Consequently, the mere presence of an in-state logo may not be enough to change preferences and increase campaign effectiveness (Collart, Palma, & Carpio, 2013).

Although past research examined the effects of state APCs on consumer preferences and WTP for fresh produce, the relationship between perceptions of local benefits individuals' visual attendance and response to marketing efforts focusing on ornamental crops remains relatively less known. The present study investigates consumers' preferences for and perceptions of local ornamental plants in the context of Florida's agricultural promotional campaign (FAPC) using a rating-based conjoint analysis experiment that incorporates visual attention metrics to explicitly measure respondents' visual attention to the FAPC logo while making decisions. The remainder of the introduction section includes a brief review of consumer perceptions related to local production benefits, visual attention literature, and the hypotheses. Next, the experimental data generation procedure and model specification are described, followed by the results and a conclusion.

[1] Ornamental plants are those grown for aesthetic purposes (e.g., flowers, colorful foliage, colorful fruit, fall color, etc.). Fruit-producing plants serve as dual purpose plants where they are ornamental when grown in residential landscapes due to their aesthetic characteristics (i.e., specimen plants, fragrant flowers, wildlife attraction, etc.) but also produce edible fruit.

1.1 | Local product benefit perceptions

Local production implies decreased distance between the production site and point-of-sale but a consistent definition of "local" does not exist (Campbell et al., 2014; Cranfield, Henson, & Blandon, 2012; Johnson et al., 2013; Megicks, Memery, & Angell, 2012; Pearson et al., 2011). Consumers' motivations to purchase local goods partly stem from perceptions of local production benefits, including perceived higher product quality, local community support, or more sustainable/environmentally friendly production methods (Born & Purcell, 2006; Feldmann & Hamm, 2015; Johnson et al., 2013; Megicks et al., 2012). Although, Born and Purcell (2006) argue that these benefits are questionable and not always accurate in local food systems.

In addition to environmental and economic benefit perceptions, sociodemographic characteristics have also been shown to influence perceived benefits and purchase likelihood (PL) of local products. For instance, in some studies, local produce purchasers tend to be young, female, residing in urban areas, and members of environmental groups (Cranfield et al., 2012; Yue & Tong, 2009). Conversely, Feldmann & Hamm's (2015) review summarizes local purchasers as older, wealthier, and living in rural areas; however, the authors acknowledge studies with conflicting results. Regarding the influence of demographics on perceived benefits, Campbell et al. (2014) found U.S. consumers who are younger, female, and educated frequently pair local production with environmentally friendly (e.g., organic) production methods.

To date, research addressing the relationship between in-state promotions, perceived benefits, and consumer demographics is limited and often focuses on fresh produce (Cranfield et al., 2012; Feldmann & Hamm, 2015; Megicks et al., 2012) with few studies on ornamental plants (Behe et al., 2013; Collart et al., 2013). The present study attempts to address this knowledge gap by investigating how consumers' local benefit perceptions interact with in-state marketing campaign logos, demographic variables, and visual attention to ornamental plants.

1.2 | Visual attention and consumer behavior

Integration of visual attention metrics into consumer behavior studies that exclusively rely on stated preferences can be valuable because it provides additional insights into decision making. Specifically, consumers' view and process relevant stimuli when deciding which products provide them with the most utility (Russo & Leclerq, 1994; Orquin & Mueller Loose, 2013; Balcombe et al., 2015; Van Loo et al., 2015). Visual attention data includes fixations (i.e., when the gaze is still and information acquisition occurs (Pieters, Warlop, & Wedel, 2002)) and saccades (i.e., rapid eye movements between fixations). Fixations reflect attribute importance with more (subjectively) important attributes receiving more fixations than those that are less important (Behe et al., 2014; Orquin & Mueller Loose, 2013; Reisen, Hoffrage, & Mast, 2008; Van Loo et al., 2015). Van Loo, Caputo, Nayga, Seo, Zhang, and Verbeke (2015) demonstrated that individuals who valued sustainable labels on coffee visually attended those labels more than consumers who valued them less. However, there are factors that can reduce fixations on important attributes (Aribarg, Pieters, & Wedel, 2010; Meißner, Musalem, & Huber, 2016; Orquin & Mueller Loose, 2013). For instance, Aribarg et al. (2010) and Orquin and Mueller Loose (2013) state familiarity improves consumers' information processing efficiency, which consequently reduces the number of visual fixations. Additionally, Meißner et al. (2016) demonstrate that as study participants gain exposure to stimuli they become more efficient (i.e., require less visual attention) decision makers due to learning. This suggests consumers' familiarity (either through existing awareness or learning) increases visual information processing and decision-making efficiency.

Several studies suggest that visual attention metrics provide numerous benefits in conjoint analysis. First, visual attention metrics can reduce model bias and improve WTP estimates by accounting for attribute nonattendance (Chavez, Palma, & Collart, 2016). Chavez et al. (2016); Van Loo et al., 2015 argues that model fit and predictive power is increased by using gaze data to address attribute nonattendance . Beyond measuring attribute nonattendance, another advantage is that eye tracking technology is nonintrusive and participants often forget their eye movements are being recorded, meaning the data accurately reflect their consideration of attributes (Maughan, Gutnikov, & Stevens, 2007). These studies suggest that combining conjoint analysis experiments with eye tracking data provides additional insights in consumer behavior research (Agarwal, DeSarbo, Malhotra, & Rao, 2014; Balcombe et al., 2015; Chavez et al., 2016;

Van Loo et al., 2015). Although there is a conceptual and theoretical connection between visual attendance and decision making (Aribarg et al., 2010; Orquin & Mueller Loose, 2013; Russo & Leclerc, 1994), the extent to which local benefit perceptions influence visual behavior and ultimately consumers' PL in the context of state marketing programs is unknown. We address this knowledge gap here.

1.3 | Research questions and hypotheses

The hypotheses tested in this study were based on the previous literature that investigated the perceived benefits of local production varying by consumers' demographics (Campbell et al., 2014; Cranfield et al., 2012), the impacts of local production attributes on choice (Collart et al., 2013), consumers' selective visual attention to important stimuli (Behe et al., 2014; Van Loo et al., 2015), and effects of exposure to stimuli and familiarity on visual attention (Meißner et al., 2016; Orquin & Mueller Loose, 2013). Specifically, we hypothesized that consumers' demographic characteristics will impact their perceived benefits of local production (H1); the FAPC logo will increase consumers' PL when compared to imported products (H2); if the presence of the FAPC logo increases consumers' PL, consumers' visual attention for products with the logo will increase (H3); consumers' benefit perceptions will increase their visual attention to the FAPC logo and their PL for those products (H4); consumers' visual attention to the FAPC logo will decrease with each additional exposure (i.e., learning process) (H5); and, consumers' who are familiar with the FAPC will visually attend to the logo LESS than unfamiliar consumers (H6).

2 | MATERIALS AND METHODS

In this manuscript, we use data partly utilized in Rihn, Khachatryan, Campbell, Hall, and Behe (2016) where consumer preferences for origin and production methods based on product end-use were investigated. Unlike Rihn et al. (2016), this manuscript addresses consumer perceptions of the benefits of local products and how that relates to their visual attention to and PL for plants displaying the FAPC logo. This section summarizes the experimental design and methodology.

2.1 | Experimental design

Table 1 shows the attributes (plant type, price, origin, and production method) and attributes levels used in the rating-based conjoint analysis scenario images. Based on the number of attributes and attribute levels, a total of 81 rating scenarios were possible ($3^4 = 81$). To reduce participant fatigue, an orthogonal fractional factorial design with nine plant scenarios was generated. For the analysis, one of the attribute levels was used as a base for comparison (i.e., kiwi vine for the plant type attribute, import for the origin attribute, and conventional production for the production method attribute). Coefficients' significance is relative to the base attributes with a positive coefficient indicating increased correlation with PL and negative vice versa.

Each scenario was presented as an image on a computer screen (58.4 cm screen diagonal measure, at 1920 × 1080 pixel resolution) with the plant image displayed on the left and attributes on an enlarged tag to the right (Figure 1). Attribute order within the tags was randomized to reduce any order effect. However, the scenario images were presented in the same order to accommodate the eye tracking software. A Tobii X1 Light Eye Tracker (Tobii Pro) was used to record participants' eye movements. The eye tracking camera was stationary and fixed to the computer monitor. After each image, participants indicated their PL on a seven-point Likert scale (1 = very unlikely; 7 = very likely).[2] Previous studies have utilized a seven-point Likert scale to measure PL of ornamental plants (Dennis et al., 2004; Phillips,

[2] After each PL rating was submitted, participants could not return to change their rating. During the instructions, participants were reminded that ratings could not be changed after they were submitted and had a practice round with an unrelated product before the actual experiment.

TABLE 1 Plant attributes and levels used in this study

Attributes	Attribute Levels
Price[a]	$15.98 (base)
	$17.98
	$19.98
Plant type	Blueberry bush
	Pineapple plant
	Kiwi vine (base)
Origin	Fresh from Florida
	Grown in United States
	Grown outside United States (base)
Production method	Certified organic
	Organic production
	Conventional (base)

Notes: [a]Price points were obtained from in-store observations in four independent garden centers, two box stores, and two grocery store/supermarket chains in the study area.

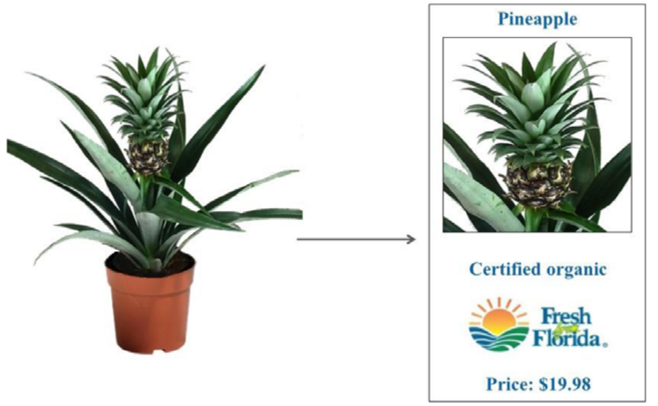

FIGURE 1 Conjoint analysis scenario image example [Color figure can be viewed at wileyonlinelibrary.com]

Holcomb, & Kelley, 2007). Last, participants completed a questionnaire with local benefit perception statements and sociodemographic questions.

2.2 | Local benefit statements

Local benefit statements were used to measure participants' perceived benefits of locally produced plants. A total of nine statements were generated based on existing literature (Born & Purcell, 2006; Campbell et al., 2014; Cranfield et al., 2012; Johnson et al., 2013; Megicks et al., 2012) and consultation with local horticulture firms. Participants were asked to rate their level of agreement with the statements using a five-point Likert scale (1 = strongly disagree; 5 = strongly agree) and statement order was randomized to remove any order effect. A five-point Likert scale was used for the benefit statements in order to reduce participants' cognitive load. Previous research has shown that five-point Likert scales are comparable to seven-point Likert scales in terms of reliability, validity, and intertertile discriminating power (Preston & Colman, 2000). For analysis, the statements were divided equally (i.e., three statements per category) into three broad categories, including 1) environmental, 2) local economy, and 3) product quality-related benefits. Environmental benefits included statements about local plants being less invasive, having a lower carbon

TABLE 2 Sample and population demographic statistics

Variables	Sample[a] Mean	Florida[b] Mean
Age [c]		
Average (years)	45.5	41.4
<18 years (%)	0.00%	21.30%
18–24 years (%)	16.10%	9.30%
25–44 years (%)	34.50%	25.10%
45–64 years (%)	36.80%	27.00%
>65 years (%)	12.60%	17.30%
Gender		
Male	35%	49%
Female	65%	51%
Household	2.12	2.48
Education		
High school degree/GED	16%	30%
Some college/Associate degree	38%	45%
Bachelor's degree or higher	46%	8%
2013 Income	$52,096	$47,507
Participants perceiving Fresh from Florida products as “local”	74%	N/A

Notes: [a] $N = 87$
[b] Source: U.S. Census Bureau (2016).
[c] Florida's mean age includes individuals under 18 years old whereas the sample does not include minors.

footprint, and having lower greenhouse gas emissions than plants from further away origins. Local economy benefit statements encompassed respondents being willing to pay more since local production helps the local economy, more money staying in the local community, and local job creation. Quality benefit statements included a broad perception of higher quality, higher quality due to less transportation damage, and longer shelf-life. For analysis, a total variable mean was generated for each broad category which was the average value of the three statements. Pairwise *t*-tests were used to test significance between the benefits' total variable means and three ordered logit models were used to determine how sociodemographic variables impacted each of the benefit perceptions (discussed shortly).

2.3 | Participant recruitment and summary statistics

Participants were recruited in Central and North Florida (Orlando and Gainesville, FL) in June–July 2014 using print newspaper and online advertisements. A total of 100 people participated in the study of which 87 participants (87% of the sample) were able to have their eye movements recorded, completed the questionnaire, and were included in the analysis. A sample size of 87 was considered acceptable since previous eye tracking/consumer preference experiments have samples with <50 participants (see Reisen et al., 2008; Reutskaja, Nagel, Camerer, & Rangel, 2011) and the sample was consistent with U.S. gardener demographics indicating sample representativeness (National Gardening Association, 2013). Mean age of participants was 45 years, 65% were female, 35% were male, and the average household size was 2.1 people (Table 2). Nearly half (46%) of the sample had a bachelor's degree or higher and the mean 2013 household income was $52,096. Most participants (74%) perceived Fresh from Florida products as “local.” Compared to the Florida Census statistics, women were overrepresented likely due to their increased interest in the topic (Table 2; National Gardening Association, 2013; U.S. Census Bureau, 2014). The sample was also slightly older than the Florida mean possibly due to not including individuals under 18. Education level and income were also slightly higher than the Florida mean.

2.4 | Visual attention metrics

The FAPC logo's ability to capture consumers' visual attention and influence their PL was measured using fixation counts (FC) which is the number of times the eye fixates on each attribute. Here, the mean number of fixations on the FAPC logo (captured by the $FC_{in\text{-}state}$ variable) was used in the models. FCs were used to investigate the relationship between consumers' perceived benefits of local origins and their visual attention to the FAPC logo via interaction terms between FCs and participants' perceived benefits of local (e.g., $FC_{in\text{-}state}$ x environment, etc.). Furthermore, as a measurement check, total visit duration (TVD), which is the total amount of time (in seconds) spent by participants viewing each attribute, was collected for each image. Specifically, TVD was used to test the robustness of the FC data and its impact over repeat exposures to the stimuli.

2.5 | Ordinal regression model

To analyze the relationship between product attributes, visual attention, local benefit perceptions and participant PL, we utilized three-ordered logit models. Ordered logit models were used because the PL rating scores are ordinal in nature and the ordered logit model "recognizes variable ordinality, avoids arbitrary assumptions about the scale, and allows for the analysis of continuous, dichotomous, and ordinal variables" (Winship & Mare, 1984). The dependent variable was a Likert scale PL rating ranging from 1 (very unlikely) to 7 (very likely).

As outlined in Long (1997) and Long and Freese (2006), the model is derived from a measurement model by mapping a latent variable y^* ranging from $-\infty$ to ∞ to an observed variable y. Considering the J number of categories in the ordinal measure, the relationship between observed and latent variable can be shown as:

$$y_i = m \quad \text{if } \kappa_{m-1} \le y_i^* < \kappa_m \quad \text{form} = 1 \text{ to } J \tag{1}$$

where κ_s are thresholds boundaries for each m category in the distribution of y^* that once crossed, results in a category change. The extreme categories 1 and J can be represented by the following open-ended intervals $\kappa_0 = -\infty$ and $\kappa_J = \infty$, which translated into the PL ratings and can be shown as:

$$y_i = \begin{cases} 1 & \textit{if } \kappa_0 = -\infty \le y_i^* < \kappa_1 \\ 2 & \textit{if } \quad \kappa_1 \le y_i^* < \kappa_2 \\ \vdots & \vdots \qquad \vdots \\ 7 & \textit{if } \kappa_6 \le y_i^* < \kappa_7 = \infty \end{cases} \tag{2}$$

Based on the measurement model (1), the structural model then can be defined as:

$$y_i^* = \mathbf{x}_i \boldsymbol{\beta} + \varepsilon_i \tag{3}$$

where $\mathbf{x}_i$ is a row vector of values for the ith observation, β is a column vector of structural parameters to be estimated, and ε is the random error term. To estimate the model using the maximum likelihood method, a specific form of the error distribution must be assumed. Although other distributions were considered in previous research (e.g., McCullagh, 1980), for the ordered logit model, the ε is conventionally assumed to have a logistic distribution with a mean of 0 and variance of $\pi^2/3$, with the following probability distribution $\lambda(\varepsilon) = \exp(\varepsilon)/[1 + \exp(\varepsilon)]^2$, and cumulative distribution $\tilde{}(\varepsilon) = \exp(\varepsilon)/1 + \exp(\varepsilon)$ functions.

The assumption of the distribution of the error term allows relating probabilities of outcomes (y) given values of $\mathbf{x}$, as shown in the following equation (Long, 1997; Long & Freese, 2006):

$$\text{Prob}(y_i = m|\mathbf{x}_i) = \text{Prob}\left(\kappa_{m-1} \le y_i^* \langle \kappa_m | \, \mathbf{x}_i\right) \tag{4}$$

By substituting $\mathbf{x}_i\beta + \varepsilon_i$ for y_i^* in Equation (4), the probability of any observed outcome $y_i = m$ given $\mathbf{x}_i$ can be generalized as the difference between cumulative distribution functions evaluated at any given m value:

$$\text{Prob}(y_i = m|\mathbf{x}_i) = F(\kappa_m - \mathbf{x}_i\boldsymbol{\beta}) - F(\kappa_{m-1} - \mathbf{x}_i\boldsymbol{\beta}) \tag{5}$$

where F indicates the cumulative distribution function. Given the formulation in Equation (5), the probability of observed value of y_i (i.e., PL rating) for the ith observation can be represented as:

$$p_i = \begin{cases} Prob(y_i = 1|\mathbf{x}_i, \beta, \kappa) & \text{if } y = 1 \\ \vdots & \\ Prob(y_i = m|\mathbf{x}_i, \beta, \kappa) & \text{if } y = m \\ \vdots & \\ Prob(y_i = J|\mathbf{x}_i, \beta, \kappa) & \text{if } y = J \end{cases} \tag{6}$$

The likelihood equation can be represented as:

$$\begin{aligned} L(\beta, \kappa|\mathbf{y}, \mathbf{X}) &= \Pi_{j=1}^{J}\Pi_{y_i=J} Prob(y_i = j|\mathbf{x}_i, \beta, \kappa) \\ &= \Pi_{j=1}^{J}\Pi_{y_i=J}\left[F(\kappa_j - \mathbf{x}_i\beta) - F(\kappa_{j-1} - \mathbf{x}_i\beta)\right] \end{aligned} \tag{7}$$

After multiplying over cases where y is observed to equal j, and taking logs on both sides, the log likelihood function becomes (Long, 1997; Long & Freese, 2006):

$$ln\, L(\beta, \boldsymbol{\kappa}|\mathbf{y}, \mathbf{X}) = \sum_{j=1}^{J}\sum_{y_i=J} \ln[F(\kappa_j - \mathbf{x}_i\beta) - F(\kappa_{j-1} - \mathbf{x}_i\beta)] \tag{8}$$

The likelihood function was estimated using Stata SPost9 postestimation package developed by Long and Freese (2006). In this instance, the "ologit" and postestimation "listcoef," "std" commands were used to estimate the standardized ordered logit models. To estimate the marginal effects, the "mfx compute, predict (outcome(1))" was used for all rating scale (1)–(7) levels. WTP estimates were then calculated as follows: WTP = $-(\beta_{\text{attribute}}/\beta_{\text{price}})$. Multicollinearity in the regressors was tested using the "collin" command to estimate variance inflation factor (VIF) values. All VIF values were within an acceptable range from 1.03 to 1.31 (<10 is considered acceptable) meaning multicollinearity is less likely to be present in the data (Hair, Anderson, Tatham, & Black, 1995).

3 | RESULTS

3.1 | Perceived benefits of local plants

Table 3 lists the local benefit perception statements and their means. Overall, participants agreed the most with local plant production creating jobs (mean of 4.18), followed by money staying in the community (4.06), helping the local economy (3.72), and having a lower carbon footprint (3.53). Regarding the broad category benefits, pairwise t-tests revealed significance (p-value < 0.001) between the benefit categories with local economy benefit perceptions obtaining the most agreement (3.989), followed by the quality benefit (3.560), and environmental benefits (3.343).

Previous research suggests that the perceived benefits of local production vary by consumers' demographics (Campbell et al., 2014; Cranfield et al., 2012). To test this variability, three-ordered logit models were performed with the perceived benefits as the dependent variables and sociodemographic traits as the independent variables (Table 4). Overall, the demographic results add to the discussion of local consumers and their perceived benefits. Previous studies indicated younger consumers prefer locally sourced products (Campbell et al., 2014; Cranfield et al., 2012; Yue & Tong, 2009), contradicting another study which reported that older consumers prefer local products (Feldmann &

TABLE 3 Perceived benefits of local plants

Perceived Benefit	Statement[a]	Statement Mean (Std. Err.)	Total Variable[b,c] Mean (Std. Err.)
Environment	Local plants are less invasive than plants produced elsewhere.	3.22 (1.113)	3.343 (0.697)
	Local plants have a lower carbon footprint than plants produced elsewhere.	3.53 (0.931)	
	Local plants have lower greenhouse gas emissions than plants produced elsewhere.	3.28 (0.916)	
Local economy	I am willing to pay more for local plants because it helps the local economy.	3.72 (0.818)	3.989 (0.616)
	Buying local plants is important to me because more of the money stays in my local community.	4.06 (0.885)	
	Buying local plants is important because it creates more jobs in the local community.	4.18 (0.652)	
Quality	Local plants are higher quality than other plant options.	3.35 (0.796)	3.560 (0.646)
	Local plants are higher quality due to less transportation damage.	3.14 (0.847)	
	Local plants have a longer shelf-life than plants produced elsewhere.	3.41 (0.881)	

Notes: [a]Participants indicated their level of agreement with the statements (1 = strongly disagree; 5 = strongly agree).
[b]Total variable means were calculated by averaging the three statement means for each perceived benefit.
[c]Pairwise *t*-tests were conducted to test significance. All total variable means were statistically significant when compared to each other (p-value < 0.001).
Perceived benefit statements were randomized to eliminate order effects.

Hamm, 2015). Our results delve into these perceptions indicating that older consumers view local ornamental plants as more environmentally friendly and helpful to the local economy than younger participants, counter to Campbell et al. (2014). Women agreed more with environmental benefit perceptions than men which is consistent with Cranfield et al. (2012), Yue and Tong (2009), and Campbell et al. (2014). As income increased, participants agreed less with environmental and quality benefits. Previous literature indicates that wealthier consumers purchase local products more often (Feldmann & Hamm, 2015); however, prior to this study, perceived benefits had not been investigated in relation to income levels. Last, participants with larger households agreed more with the quality benefits than those from smaller households. Discrepancies between existing literature and the current study may reflect different products, sample locations, and measures since the current study investigates specific benefits, whereas others incorporated PL for local products (Campbell et al., 2014; Cranfield et al., 2012; Feldmann & Hamm, 2015; Yue & Tong, 2009).

3.2 | Conjoint analysis results

The Akaike's information criterion (AIC) and Bayesian information criterion (BIC) were used to compare model fit across models 1, 2, and 3. Results are inconclusive with the AIC score decreasing for each model with the lowest score occurring in model 3 (Table 5). Conversely, the BIC score increases for each model with the highest value for model 3. Although previous studies found that visual attention metrics improve model fit (Balcombe et al., 2015; Chavez et al., 2016; Van Loo et al., 2015), these results indicate that further research is needed to validate their contribution to different model specifications.

Attribute and sociodemographic coefficient estimates for models 1, 2, and 3 were comparable (Table 5). The coefficient estimates for plant type shows that blueberries were preferred to kiwi vines, and that the coefficient for pineapple was not significant. Compared to imported plants, plants with in-state and domestic origins positively affected consumers' PL ratings, implying that products from closer origins were preferred to those from further destinations. This

TABLE 4 Sociodemographic characteristics' impact on consumers' perceived benefits of local plants

	Perceived Benefits		
	Environment	Local Economy	Quality
	Coef. (Std. Err.)	Coef. (Std. Err.)	Coef. (Std. Err.)
Age	0.010 (0.004)*	0.012 (0.004)**	0.002 (0.005)
Gender	−0.462 (0.137)***	0.111 (0.134)	−0.096 (0.134)
Income	−0.139 (0.023)***	−0.026 (0.023)	−0.052 (0.024)*
Household	−0.068 (0.041)	−0.028 (0.041)	0.293 (0.042)***
Education	−0.038 (0.042)	−0.026 (0.042)	0.005 (0.042)
Threshold parameters			
κ_1	−5.273 (0.429)	−3.066 (0.310)	−4.086 (0.418)
κ_2	−4.135 (0.329)	−1.567 (0.264)	−3.378 (0.345)
κ_3	−3.825 (0.313)	−1.301 (0.262)	−1.653 (0.273)
κ_4	−2.932 (0.284)	−0.368 (0.258)	−0.681 (0.262)
κ_5	−2.181 (0.273)	0.926 (0.257)	0.178 (0.262)
κ_6	−1.176 (0.266)	1.370 (0.259)	1.286 (0.269)
κ_7	−0.435 (0.263)	2.225 (0.267)	2.000 (0.275)
κ_8	0.562 (0.264)	—	3.126 (0.294)
κ_9	1.200 (0.271)	—	3.872 (0.323)
κ_{10}	2.415 (0.302)	—	—
κ_{11}	3.839 (0.417)	—	—
Number of obs.	783	783	783
Log likelihood	−1641.3	−1464.1	−1536.9
AIC	3314.69	2952.10	3101.72
BIC	3389.30	3008.05	3167.01

Notes: ***, **, * indicate significance at *p*-value ≤0.001, ≤0.010, and ≤0.050, respectively.
An ordered logit model was used to determine the relationship between sociodemographic variables and perceived benefits.

may be due to the perceived benefits of higher product quality, local economy support, and being more environmentally friendly than products from greater distance (Campbell et al., 2014; Onken et al., 2011; Yue & Tong, 2009) which is tested in model 3. Additionally, certified organic and organically produced plants had higher PL ratings when compared to conventionally produced plants.

Regarding sociodemographics, older participants had a lower PL than their younger counterparts. This result aligns with current trends in the ornamental plant industry which show that demand for food producing plants is increasing primarily due to young consumers wanting to grow their own produce (National Gardening Association, 2013). The estimated coefficients for income were negative meaning that increases in income levels negatively impact PL. Although this negative association between income levels and PL does not fully concur with theoretical predictions, a recent study (Hovhannisyan & Khachatryan, 2017) reported a large variability in expenditure elasticity estimates for foliage plants. There was a positive relationship between household size and PL meaning that as household size increased, PL increased. This result may stem from larger households having children and valuing the educational component of gardening and growing their own food, and knowing exactly how that food was produced (Campbell et al., 2014; Yue & Tong, 2009). Alternatively, there may be an economic incentive for larger households to supplement their household groceries with fresh produce they grew themselves. The negative association between the higher education level and PL could be associated with more knowledge about plant care and maintenance requirements, which is regularly cited by horticultural consumers as the most important barrier (Rihn, Khachatryan, Campbell, Hall, & Behe, 2015;

TABLE 5 Ordered logit model estimates for attribute, visual attention, and perceived benefit variables on purchase likelihood rating scores

Variables	Attribute variables	Attribute + visual attention to logo	Attribute + visual attention + perceived benefit variables
	Model 1 Coef. (Std. Err.)[a]	Model 2 Coef. (Std. Err.)[a]	Model 3 Coef. (Std. Err.)[a]
Pineapple	0.208 (0.155)	0.155 (1.350)	0.217 (0.155)
Blueberry	0.664 (0.158)***	0.666 (0.158)***	0.685 (0.158)***
Kiwi [base level]			
Price	–0.076 (0.039)*	–0.076 (0.039)*	–0.077 (0.039)*
In-state	0.549 (0.157)***	0.548 (0.157)***	0.554 (0.157)***
United States	0.417 (0.156)**	0.416 (0.156)**	0.419 (0.157)**
Import [base level]			
Certified organic	0.936 (0.159)***	0.938 (0.159)***	0.952 (0.160)***
Organic production	0.583 (0.155)***	0.583 (0.155)***	0.59 (0.156)***
Conventional production [base level]			
Age	–0.020 (0.004)***	–0.019 (0.004)***	–0.018 (0.005)***
Gender	0.237 (0.134)	0.195 (0.136)	0.198 (0.138)
Income	–0.055 (0.024)**	–0.060 (0.024)**	–0.064(0.024)**
Household	0.179 (0.043)***	0.190 (0.043)***	0.197 (0.045)***
Education	–0.167 (0.041)***	–0.166 (0.041)***	–0.188 (0.042)***
Visual attention[b]			
$FC_{in\text{-}state}$	–	0.055 (0.026)*	–0.147 (0.153)
Visual attention × Perceived benefits[c]			
$FC_{in\text{-}state}$ × environment	–	–	-0.06 (0.030)*
$FC_{in\text{-}state}$ × local economy	–	–	0.093 (0.028)***
$FC_{in\text{-}state}$ × quality	–	–	0.013 (0.026)
Threshold parameters[d]			
κ_1	–3.301 (0.773)	–3.116 (0.779)	–3.126 (0.781)
κ_2	–2.629 (0.770)	–2.437 (0.776)	–2.449 (0.780)
κ_3	–2.070 (0.767)	–1.874 (0.773)	–1.889 (0.775)
κ_4	–1.684 (0.765)	–1.487 (0.772)	–1.501 (0.774)
κ_5	–0.660 (0.764)	–0.465 (0.770)	–0.464 (0.772)
κ_6	0.291 (0.765)	0.485 (0.771)	0.506 (0.773)
Number of obs.	783	783	783
Log likelihood	–1401.5	–1399.3	–1393.4
AIC	2838.97	2836.59	2830.79
BIC	2922.91	2925.19	2933.38

Notes: ***, **, * indicate significance at *p*-value ≤0.001, ≤0.010, and ≤0.050, respectively.
[a]A higher coefficient indicates increased purchase likelihood when compared to the base variables ('kiwi vine', 'import', 'conventional').
[b]Visual attention was measured using fixation counts (FC).
[c]Interaction terms tested the relationship between perceived benefits of local production and visual attention to the FAPC logo.
[d]Threshold parameters indicate the estimated cutpoints used to differentiate between each purchase likelihood level.

TABLE 6 Willingness-to-pay based on models 1, 2, and 3 coefficient estimates

	Model 1	Model 2	Model 3
Blueberry	$8.74	$8.75	$8.86
In-state	$7.22	$7.19	$7.17
Domestic	$5.48	$5.46	$5.42
Certified organic	$12.31	$12.32	$12.30
Organic production	$7.67	$7.66	$7.63

Yue et al., 2016). Last, the coefficient for gender was not statistically significant meaning that gender differences did not influence participants' PL.

Models 2 and 3 incorporated visual attention metrics. Specifically, model 2 included a variable measuring the fixations on the FAPC logo (termed "$FC_{in\text{-}state}$"). The $FC_{in\text{-}state}$ variable was significant (p-value = 0.038) and positive indicating that fixations on the logo improves participants' PL, partially supporting hypothesis 3. Model 3 built on model 2 by incorporating interaction terms consisting of fixations on the FAPC logo and the perceived benefits of local production. Participants who fixated on the FAPC logo and agreed that local production provides environmental benefits ranked their PL lower. Conversely, participants who fixated on the FAPC logo and agreed that local production aids the local economy were more likely to rank their PL higher. The quality benefit did not significantly impact visual attention and PL.

Marginal effects were estimated and indicate how a change in one variable affects the probability of each possible outcome while controlling for all the other variables (see online appendix A, Tables A1, A2, and A3). The marginal effects for attributes were consistent across all three models. The positive and statistically significant estimates for the origin and production method attributes in the slightly likely (i.e., 5), moderately likely (6) and very likely (7) columns indicate a greater PL for in-state, domestic, certified organic, and organically grown plants. The price attributes decrease in probability of purchase at each PL level. Blueberry had an increasing probability of purchase when compared to kiwi vine. In model 2, visual attention to the FAPC logo improved the probability of purchase (Table A2). Individuals who fixated on the FAPC logo and agreed that local production benefited the environment had a decreasing probability of purchase (Table A3). Individuals who fixated on the FAPC logo and agreed that local production benefited the local economy had an increasing probability of purchase.

3.3 | Willingness-to-pay estimates

WTP calculations are based on the statistically significant coefficients from the ordered logit models 1, 2, and 3 (Table 6). Participants were willing to pay $8.74 to $8.86 more for blueberry plants when compared to the base alternative (kiwi vines). Regarding the FAPC logo, participants were willing to pay $7.17 to $7.22 more for plants with the logo compared to imported plants. They were also willing to pay $5.42 to $5.48 more for domestically grown plants when compared to imported ones. If the plant was organically grown, participants were willing to pay $12.30 to $12.32 more for certified and $7.63 to $7.67 more for organically produced (i.e., without certification) plants when compared to conventionally produced plants.

3.4 | Visual attention results discussion

The inclusion of visual attention metrics in conjoint analysis scenarios provides an opportunity to add to the literature on participant familiarity and learning patterns. Previously, research has demonstrated that participants' visual attention may decrease due to familiarity (Aribarg et al., 2010; Orquin & Mueller Loose, 2013), a learning pattern connected to repeat exposure between scenarios (Meißner et al., 2016), or a combination of the two. Here, participants' mean FCs and TVD (in seconds) are presented by order of appearance to aid in understanding how familiarity and learning impact visual attention. The FAPC logo was used in three scenario images which were classified as "appearance 1" (A1),

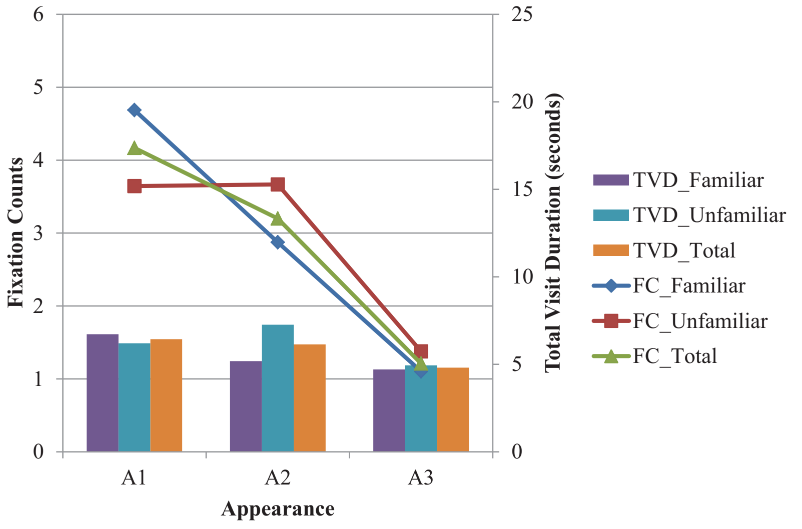

FIGURE 2 Mean fixation counts and total visit duration, by chronological appearance
Note: Pairwise *t*-tests were used to test significance between appearances by familiarity. Fixation counts (FC) were measured on the in-state promotion logo, whereas the total visit duration (TVD) included the viewing time for the entire image to test for the learning effect. For the total sample's FCs, pairwise *t*-tests indicated significance (*p*-values < 0.050) between A1 – A3 and A2 – A3, whereas FCs were marginally significant between A1 and A2 with a *p*-value of 0.061. For the FC data, pairwise *t*-tests indicated significance (*p*-value < 0.050) between all appearance levels for the "familiar" group. FCs were significant for the "unfamiliar" group between A1 – A3 and A2 – A3. The "unfamiliar" group's FCs was insignificant between A1 – A2. The total sample's TVD was not significant between A1 and A2 (*p*-value 0.107) but was significant between A1 – A3 and A2 – A3. When separated by familiarity, all TVDs were statistically significant at the different levels for the "familiar" and "unfamiliar" groups
[Color figure can be viewed at wileyonlinelibrary.com]

"appearance 2" (A2), and "appearance 3" (A3; Figure 2). The total sample FCs and TVDs decrease with each subsequent appearance supporting a learning pattern hypothesis.

To test if participant familiarity influenced visual attention in successive appearances, participants were divided into 2 groups based on if they recalled seeing 'Fresh from Florida' promotions on ornamental plants prior to the study.[3] The sample divided into 'familiar' (participants who answered 'yes'; 52% of the sample) and 'unfamiliar' ('no'; 48%) groups.[4] FC and TVD means were generated for each group. The familiar group demonstrated a steady significant downward trend (for both FCs and TVD recordings) with each subsequent appearance (Figure 2). Pairwise t-tests indicate significance between each appearance (*p*-value < 0.050). Interestingly, in the unfamiliar group's fixations, there was a lag between the first and second appearance of the FAPC logo where their FCs were not significantly different. However, the unfamiliar group's third exposure was much lower and comparable to the familiar group's mean FCs. Regarding the unfamiliar group's TVD, their time spent viewing the image increased at the second appearance before lowering to similar levels as the familiar group on the third appearance. These results are consistent with familiarity reducing the need to visually attend to the variable since the familiar group had a steady decrease in fixations and TVD whereas the unfamiliar group paused and spent more time reevaluating the logo in the second appearance. There is also the possibility that participant fatigue may have influenced the decreasing visual attention metrics; however, the study was designed to mitigate possible fatigue by having participants only evaluate nine products at the beginning of the experiment. Furthermore, if the decreasing visual attention pattern was due to participant fatigue, one would

[3] The question was framed as: 'Prior to the study, do you recall seeing the Fresh from Florida promotion on ornamental plants? (yes/no)'

[4] The authors estimated model 3 with the familiarity coefficient included but it was insignificant (p-value 0.351) and was therefore excluded from the final estimation. Even though familiarity did not influence PL, it does impact visual attention, as shown in Figure 2.

expect the same pattern regardless of participant familiarity because they are viewing the same nine scenarios. Here, we see distinct differences between the familiar and unfamiliar group indicating a learning effect.

4 | CONCLUSION AND DISCUSSION

This study used FAPC (fresh from Florida) as a framework to investigate consumers' preferences and WTP for locally produced fruit-producing ornamental plants. Participants' eye movements were recorded to provide additional insights on the relationship between visual attention, perceived benefits of local production, and PL. A key finding is that the presence of the FAPC logo positively impacted consumers' PL, whereas visual attention to that logo had a slight positive impact on PL. A second key finding is that perceived local economy benefits were the best received by participants and when interacted with visual attention resulted in an increased PL. Third, we found that increased exposure (by subsequent appearances) to the FAPC logo decreased participants' visual attention but varied by familiarity with the program. This may be due to participants' learning patterns, which subsequently reduced their visual attention to the visual stimulus in the experiment. This case suggests that with increased exposure to the logo in the retail setting, consumers become accustomed to it and their PL increases even if they do not visually attend to the sign for the same amount of time as they did previously. This aligns with hypotheses 5 and 6 (visual attention will decrease with increased exposure and familiarity) and that reduced visual attention does not diminish the importance of designating products as locally produced. Overall, future research that investigates the relationship between visual attention to promotions and preferences could expand our understanding of the effectiveness of state marketing campaigns.

Results also have interesting implications in terms of incorporating gaze data into conjoint analysis and consumer behavior experiments. Specifically, the FC means demonstrate how visual attention variables could be used to delve into another layer of the consumer decision-making process (Aribarg et al., 2010; Meißner et al., 2016; Orquin & Mueller Loose, 2013). However, it is worth noting that although visual attention metrics provide practical insights, they can be challenging to interpret in the context of inherent tradeoffs in choice experiments. More empirical analyses are needed to assess the methodological contributions of visual attention measures in consumer choice experiments.

Due to the nature of the study, there are several limitations which provide direction for future research. One limitation is that (to accommodate the eye tracking technology) participants needed to be physically present which resulted in a localized sample. This is consistent with current practices involving eye tracking (Reutskaja et al., 2011; Van Loo et al., 2015). Remote eye tracking platforms are currently being developed and the validity this framework can be tested when such data collection methods become available to researchers. The small sample size is another limitation. Eye tracking studies require substantial resource inputs (labor, time) and therefore often have smaller sample sizes than similar consumer behavior studies. Although other eye tracking studies have used substantially smaller samples than what was used here (Reisen et al., 2008; Reutskaja et al., 2011), larger sample sizes would allow more degrees of freedom to compare treatment/control groups. Due to the small, localized nature of the sample, results may not be fully representative of the general population; however, the demographic characteristics of our sample did align with plant consumers (National Gardening Association, 2013) indicating robustness.

There are also several future research opportunities that could stem from this study. First, the FAPC may have implications for other state programs since Florida is a leading production state of ornamental plants. Future studies could evaluate the impact of the FAPC logo on plants throughout the greater United States to assess its influence on U.S. consumers' behavior. Or, similar studies could be conducted in different locations using the study state's APC logo.

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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