College-Age Millennials' Preferences for Food Supplied by Urban Agriculture

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Millennials are the largest generation, yet. As a result, their preferences are critical when it comes to evaluating success of urban agriculture. Using two online choice experiments, this paper investigates the preferences and willingness to pay of college student millennials for unprocessed (fresh) or processed (typically come in a container) food products sold at urban farms. We also examine whether competing points of sale and other attributes, such as organic, affect preferences, and willingness to pay for urban farm food. We find that, on average, college-age millennials are willing to pay a premium for local food. However, they are not willing to pay premiums for local food that is sold at farmers markets, and discount it when it is purchased directly from an urban farm. Our findings suggest that, if the goal is to increase the sales of urban farm food, targeted promotions are needed. Urban farms have to show the value from purchasing products through their channels to college-age millennials or seek the means to supply their food through grocery stores.

Keywords: farmers market, food systems, local, organic, tomatoes, tomato pasta sauce, sustainability, urban farm

INTRODUCTION

Consumers' interest in direct-to-consumer marketing channels such as farmers markets, and urban farms is increasing (Zepeda, 2009; Landis et al., 2010; Tropp, 2013). These venues attract consumers because they offer the opportunity to purchase food directly from the grower (AMS, 2016). This in turn, allows customers to connect and develop a personal relationship with the seller (Onianwa et al., 2006). It also enhances their trust in food production because they appreciate knowing where their food comes from Zepeda and Leviten-Reid (2004) and McGarry-Wolf et al. (2005). Moreover, consumers believe that direct-to-consumer channels have a positive effect on the environment, local economy, and farmers' profits (Zepeda, 2009; Landis et al., 2010), while offering access to natural, fresh, and organic food with perceived health benefits (Kolodinsky and Pelch, 1997; Armstrong, 2000; Landis et al., 2010; Sumner et al., 2010). In order to cater to this trend, municipalities started to work on re-purposing vacant lots within cities to provide more

opportunity for urban agriculture (Goldstein et al., 2011; Dieleman, 2017)[1]. However, overall direct sales are still rather low (Low et al., 2015).

The low direct-to-consumer sales are rather surprising, as previous research suggests that consumers consider "local" to be the highest value-added claim (Loureiro and Hine, 2002; James et al., 2009; Onozaka and Thilmany-McFadden, 2011). In fact, an abundance of research examines the trends in consumer demand and support of locally grown food, uncovering strong preference and higher willingness to pay (WTP) for it (Hu et al., 2009, 2012; Onken et al., 2011; Carroll et al., 2013; Willis et al., 2013; Meas et al., 2015; Printezis and Grebitus, 2018). For instance, using a national Web-based survey, Onozaka and Thilmany-McFadden (2011) provided evidence that "locally grown" is the most valued claim for Gala apples and red round tomatoes compared to other types of food certifications (e.g., organically grown and fair trade). Also, interviewing Colorado residents in supermarkets, Loureiro and Hine (2002) show that consumers are willing to pay more for local, Colorado grown, fresh potatoes compared to organic and GMO-Free potatoes. Similarly, surveying consumers in 65 counties of Pennsylvania, James et al. (2009) find that consumers have a higher WTP for local applesauce compared to applesauce labeled as USDA organic, low fat, or no sugar added. Apart from local, consumers are also willing to pay more for "organic" (Loureiro and Hine, 2002; Costanigro et al., 2011; Hu et al., 2012; Meas et al., 2015), and in some instances, food labeled as being both local and organic. For example, conducting a study among the shoppers in Colorado chain store, Costanigro et al. (2011) found that consumers are willing to pay more for both organic and local attributes of fresh Gala apples. However, the WTP of $1.18 for local attribute is comparatively higher than the WTP for organic, which is $0.20. This attests further to the fact that local is a more important attribute than other value-added characteristics. Nevertheless, the interaction effects between food labeled as local and organic needs to be investigated because previous studies suggest that there could be a sub-additive or super-additive relationship[2] among these competing attributes (Gracia et al., 2014; Meas et al., 2015).

In addition to food attributes, the literature on WTP for local has shed light on a number of different product types. It becomes evident that consumers' preference for locally produced food persists for fresh, unprocessed locally grown produce (Willis et al., 2013) as well as for processed items, such as local blackberry jam (Hu et al., 2012), and local strawberry preserves (Onken et al., 2011). Moreover, studies show that consumers are willing to pay more for a wide variety of processed local food. For example, conducting an in-store survey among Kentucky residents, Hu et al. (2009) find that consumers have a higher WTP for pure

blueberry jam, blueberry-lime jam, blueberry yogurt, blueberry dry muffin mix, and blueberry raisinettes. Furthermore, research suggests that again local ranks higher than other attributes for processed food, as demonstrated by local blackberry jam compared to organic blackberry jam (de-Magistris and Gracia, 2016), and local applesauce compared to one labeled as USDA organic, low fat, or no sugar added (James et al., 2009). Given the profound evidence on preferences for local food, the question arises as to why direct sales are still low (Low et al., 2015). Therefore, it is of interest to examine consumer preferences and WTP for fresh and processed food sold at urban farms, since venues like this seem to offer the "most local" food.

To conduct our study, we focus on the largest adult generation in the U.S. – millennials. With over 80 million people in the U.S. alone, millennials, born between 1982 and 2000, are a particularly influential group of food consumers (Wey Smola and Sutton, 2002; Heaney, 2007; US Census Bureau, 2015; Futurum Research, 2016). They have a tremendous spending power that is predicted to reach one trillion dollars in 2020 (Futurum Research, 2016). It is also valuable to focus on this generation because in 2020 one in three Americans will be a millennial (Futurum Research, 2016). Given the low number of overall direct sales and the large share of millennials, it is of interest to investigate the demand of this consumer segment for direct-to-consumer channels. In fact, analyzing millennials' purchase behavior is not only relevant because of their current spending power, but also because their impact on the food system will continually increase over time. Therefore, we examine whether millennials prefer direct-to-consumer channels, and more specifically, whether they are willing to pay a premium for food from urban farms.

Millennials represent a large share of the U.S. population, and they are a corner stone when it comes to purchase power in food markets. Given the size of this cohort, their impact may grow even further. To the authors' knowledge, research that examines millennials and their preferences for urban farm food is sparse. Past research involving millennials shows that they have a positive attitude toward organic food (Kamenidou et al., 2019) and a higher WTP for it (Organic Trade Association, 2016; Molinillo et al., 2019). In fact, they are very knowledgeable about organic products and possess a high level of trust in its labeling, resulting in them being the largest organic food buyer segment in the U.S. (Organic Trade Association, 2016). College-aged millennials, interested in buying organic produce to prepare their meals, shop at farmers markets (Detre et al., 2010). Also, millennials with higher involvement in food are more attentive to food labels and country of origin labeling (Küster et al., 2019). Finally, millennials who are more knowledgeable with regards to food are more accepting of technologies, where such technologies can improve sustainability (Cavaliere and Ventura, 2018). This implies that millennials may be willing to pay a premium for organic food supplied directly through urban agriculture. In addition, they might prefer local food since they are taking origin labeling into account.

This research contributes to the literature by examining millennials' preferences and WTP for food sold by urban farms, farmers markets, and grocery stores, as reference point. Specifically, we focus on millennials' WTP for processed and

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[1]Urban agriculture includes farming in vacant lots and parks in urban areas (USDA Urban Agriculture, 2016), CSAs in urban locations, as well as, farms in the greenbelts of metropolitan areas (Urban Agriculture, 2016; Bailkey and Nasr, 1999).

[2]Two attributes are considered to have a sub-additive (super-additive) relationship when there exists (does not exist) an overlap between their values in the WTP that results in a discounted (higher) total premium compared to the sum of individual WTP for the attributes. This overlap can be determined by examining the sign of the interaction effects between these attributes.

unprocessed food, while accounting for possible interactions between local and organic labeling. We also account for possible interactions between the point of sale, and local and organic labeling. We do so because Grebitus et al. (2017) found that consumers perceive food from urban farms as organically produced, while Ellison et al. (2016) showed that tomatoes from direct-to-consumer outlets were believed to be organic. We aim to answer the following questions. (1) Do millennials prefer to shop for (local and organic) food from urban farms? (2) Are millennials willing to pay more when purchasing (local and organic) food from an urban farmer? (3) Does WTP for urban farm food differ based on whether it is processed or unprocessed? We address our research questions using two online choice experiments surveying millennials – specifically college students, who are the youngest members of the millennial generation and are responsible for purchasing the food they consume—in the Phoenix Metropolitan Area. Previous research shed some light on consumption behavior of college-age millennials in different retail outlets, including farmers markets (Noble and Noble, 2000; Morton and Linda, 2002; Noble et al., 2009; Detre et al., 2010). However, to our knowledge, no study has explored their preference for food from urban farms.

The remainder of the paper is as follows. In the next section we describe the choice experiments, then we explain the econometric model before we present the empirical results. We finish with some concluding remarks.

METHODS

We conducted two online choice experiments with millennials, i.e., Generation Y college students, to simulate food purchase decision making. We used hypothetical choice experiments including cheap talk to estimate marginal WTP (Carlsson and Martinsson, 2001; Lusk and Schroeder, 2004). To account for differences in processed and unprocessed food products we carried out two studies with: (1) a fresh produce item, one pound of fresh tomatoes, and (2) a processed food item, 24-ounce jar of tomato pasta sauce, which is a standard size jar for this type of product. We chose these products because they are common and familiar food items that consumers can buy at all three shopping locations included in the study. Also, tomatoes are the second most consumed fresh vegetable[3] in the US, with 28.7 pounds of tomatoes available for consumption per person in 2017 (USDA, 2017a,b). Tomato pasta sauce, on the other hand, is the most consumed processed tomato product (USDA Tomatoes, 2016). This ensures that participants are familiar with the products they are choosing. Furthermore, in the study location Arizona local tomatoes can be grown year-round (Arizona Harvest Schedule, 2016). Thus, tomatoes and tomato pasta sauce are not season specific items and are readily available to consumers throughout the year.

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[3]Even though botanically tomato is a fruit, in 1893 the U.S. Supreme Court ruled it to be considered a vegetable (NIX v. HEDDEN, 1893).

TABLE 1 | Choice experiment attributes and levels.

Attributes	Levels		
Price			
Tomatoes (1lb)	$0.99	$2.99	$4.99
Tomato pasta sauce (24-ounce jar)	$1.99	$3.99	$5.99
Travel time	Travel time one-way 5 min	Travel time one-way 15 min	Travel time one-way 25 min
Point of Sale	Grocery store	Farmers market	Urban farm
Certified organic	USDA organic	No label	
Local production	Locally grown	No label	

Choice Experiment Attributes

Our two choice experiments include five attributes—point of sale, organic, local, travel time, and price—displayed in **Table 1**. The price has three levels with a price range reflecting low-end, average, and high-end prices of the products in the marketplace. The attribute regarding local production was displayed as a "Locally grown" label, which was either present or absent. Similarly, the certified organic attribute was displayed as the "USDA Organic" label that was either present or absent.

The focus of this study is on the distribution location, which is deemed an important food shopping attribute (Craig et al., 1984). We include urban farm, farmers market, and, for comparison, grocery store. We provide a definition of urban farm before the experiments in case participants are unfamiliar with it. In addition, we do not only include location itself but also travel time because consumers will always try to minimize distance to the outlet (Handy, 1992). Hence, convenience is a significant driver of store choice (Briesch et al., 2009). Urban farms might be at a disadvantage due to not only a limited assortment but also a more remote location (Kezis et al., 1984; McGarry-Wolf et al., 2005; Gumirakiza et al., 2014). We include 5, 15, and 25 min for a one-way trip to the point of sale as our measure of travel time as choice experiment attribute.

The extent of processing may confound the identification of the distribution channel, as direct channels are often associated with fresh foods only, and also with local labeling. Previous studies on local food examine preferences and WTP for fresh produce (Darby et al., 2008; Costanigro et al., 2011; Onozaka and Thilmany-McFadden, 2011) and processed food items (James et al., 2009; Hu et al., 2012). The question of how processing affects the "local premium" and how this is related to urban farming is important as it represents a substantial investment in value-added by often small and potentially urban farmers. A review from 2000 to 2014 supports this notion (Feldmann and Hamm, 2015). Therefore, we compare the WTP for an unprocessed, fresh produce item (tomatoes) and a processed food item (tomato pasta sauce) sold at different points of sale, including urban farms, farmers markets and grocery stores.

Design of Experiment

The choice experiment design consists of four blocks with nine choice sets each, for a total of 36 choice sets. To minimize fatigue

FIGURE 1 | Sample choice set for 1 lb of tomatoes.

or learning effects each participant is only presented with one block (Lusk and Norwood, 2005). The order of the choice sets in each block is randomized, and each respondent is randomly assigned to one of the four blocks. Each choice set consists of four choice options plus an opt-out option ("None of these").

The design was created following Scarpa et al. (2012). First, an orthogonal design was generated. This design was used in a pre-test with $n = 21$ participants. The pre-test data was analyzed, and the estimated coefficients were used as priors to create a Bayesian efficient design. The design included price, organic, local, point of sale, and travel time as attributes. Furthermore, interaction effects were included to account for relationships between farmers market and urban farm, and local, and organic. As a result, we are able to specify whether organic or local food from urban farms leads to higher or lower WTP. In addition, this allows us to investigate, whether products labeled as local *and* organic increases or decreases WTP.

Data

The online choice experiments were conducted using a between-subject design with $n = 173$ participants in the "tomato" experiment and $n = 270$ participants in the "tomato pasta sauce" experiment. Data for the experiments can be found in **Supplementary Tables 1** (tomato pasta sauce) and **2** (tomatoes). The respondents recruited were third- and fourth-year students—who are the youngest members of the millennial generation—at Arizona State University students that received class credit for their participation.

The experiment was programmed in Qualtrics. To begin, each participant read a cheap talk script to lower hypothetical bias (Cummings and Taylor, 1999). Cheap talk explained that it is important to make each decision as if one was actually facing it in real-life. Afterwards, respondents were asked to make their choices. A sample choice set is displayed in **Figure 1**.

In addition to the choice experiment, participants answered demographic questions, specifying, among others, their age, gender, and household size. The survey produced an eligible

TABLE 2 | Sample characteristics.

Characteristics	Tomatoes (% unless stated)	Tomato pasta sauce (% unless stated)
Number of observations	172	270
Age in years (mean)	21.66	22.84
Household size (mean)	3.27	3.04
Children under the age of 12 in the household	5.81	7.04
Household income (mean in $)	48,386.63	45,028.41
Gender (female) (%)	45.35	34.44
Educational level (%)		
High school diploma	16.30	13.58
Some college	71.51	64.15
Bachelor's degree	12.21	22.26

sample of 442 participants, one participant had to be excluded as (s)he did not complete the survey. Summary statistics for the basic socio-demographic characteristics of the sample are presented in **Table 2**. Less than half of participants are female. Participants are on average 22 years old, living in a 3-member household. Using this sample, we are able to estimate the WTP with an econometric model appropriate for discrete-choices among local food products.

Model

To analyze our data we used mixed logit models to allow for variations in consumer preferences that may arise from correlation in unobserved factors over sequential treatments, unrestricted substitution across product attributes, and random taste differences (Train, 2009).

In choice modeling it is assumed consumer i maximizes his or her utility by choosing a product among j alternatives with attributes that provide the highest level of utility at choice occasion t. The utility consists of a deterministic component

V_{ijt}, which includes the specified attributes of the product, and a random component e_{ijt}, which is unobservable to the researcher:

$$U_{ijt} = V_{ijt} + e_{ijt} \qquad (1)$$

Under the assumption of a linear utility functional form, the deterministic component can be written as $\beta'_i x_{ijt}$ so the indirect utility function is written:

$$U_{ijt} = \beta'_i x_{ijt} + e_{ijt} \qquad (2)$$

where β_i is a vector of structural parameters that are specific to consumer i and x_{ijt} is a vector of the observed variables of the alternative j faced by consumer i at the choice occasion t.

In our choice experiments respondents were asked to make nine choices each for tomatoes and tomato pasta sauce. The choices are analyzed as follows:

$$
\begin{aligned}
U_{ijt} = {} & \alpha_i Price_{jt} + \beta_{1i} UrbanFarm_{jt} + \beta_{2i} FarmersMarket_{jt} \\
& + \beta_{3i} OrganicLabel_{jt} + \beta_{4i} LocalLabel_{jt} + \beta_{5i} TravelTime_{jt} \\
& + \beta_{6i} UrbanFarm_{jt} OrganicLabel_{jt} \\
& + \beta_{7i} UrbanFarm_{jt} LocalLabel_{jt} \\
& + \beta_{8i} FarmersMarket_{jt} OrganicLabel_{jt} \\
& + \beta_{9i} FarmersMarket_{jt} LocalLabel_{jt} \\
& + \beta_{10i} OrganicLabel_{jt} LocalLabel_{jt} + e_{ijt} \qquad (3)
\end{aligned}
$$

where α_i is the price parameter, and β_{ki} are attribute parameters varying over consumers i. $Price_{jt}$ is one of the three price levels of option j in choice set t. $TravelTime$ is one of the three travel times of option j in choice set t. $UrbanFarm$ and $FarmersMarket$ are binary variables equal to 1 if tomatoes (tomato pasta sauces) are sold at either the urban farm or farmers market, and zero if they are sold at the grocery store. $OrganicLabel$ and $LocalLabel$ are binary variables equal to 1 if the products are certified organic or produced locally, and zero otherwise. $UrbanFarm^*OrganicLabel$ is an interaction term representing the products sold at the urban farm *and* labeled as certified organic, and zero otherwise. $UrbanFarm^*LocalLabel$ is an interaction effect indicating that tomatoes (tomato pasta sauces) sold at the urban farm are locally produced, zero otherwise. $FarmersMarket^*Organic$ is an interaction effect representing those products that are sold at the farmers market *and* labeled organic zero otherwise. Similarly, $FarmersMarket^*LocalLabel$ is an interaction effect representing those products that are sold at the farmers market *and* produced locally, zero otherwise. $LocalLabel^*OrganicLabel$ is an interaction effect representing those products that are both, organic and local, zero otherwise, and e_{ijt} is the error term. The mixed logit models are estimated with 500 Halton draws (Revelt and Train, 1998).

Once preferences are determined we calculate WTP by dividing the attribute coefficients by the negative of the price coefficient (Greene, 2016):

$$WTP_n = \left(\sum_{i=1}^{k} \left(-\frac{\beta_{ni}}{\beta_{pricei}} \right) \right) / k \qquad (4)$$

We determine the significance of the WTP estimates following Daly et al. (2012):

$$\left(\frac{\beta_n}{\beta_0} \right)^2 \left(\frac{\omega_{nn}}{\beta_n^2} + \frac{\omega_{00}}{\beta_0^2} - 2\frac{\omega_{n0}}{\beta_n \beta_0} \right) \qquad (5)$$

where β_0 is the price parameter, β_n are attribute parameters, and ω is the variance and covariance for the parameter estimates.

EMPIRICAL RESULTS

Preferences

The results of the mixed logit models for tomatoes and tomato pasta sauce are presented in **Tables 3**, **4**, respectively. In each table the first column shows the model without interaction effects, the next two columns introduce interaction effects stepwise, and the last column shows the results of the full model including all interaction effects. The models are highly significant as shown by McFadden's Pseudo R^2. Based on the log-likelihood functions the full model is significantly improving in model fit for both, tomatoes and pasta sauce, when tested against the limited models.

The full models include five interaction effects. This means that the interpretation of the main effects depends on the interaction effect interpretation. We follow Meas et al. (2015) and include interaction effects as dummy variables (values one or zero) in the equations.

In both models the *price* coefficient is significant and negative as expected, indicating that a higher price of an alternative lowers the probability to be chosen. Compared to shopping for the products at the *grocery store*, college-age millennials do not have a significant preference for shopping at the *farmers market* (main effect). The main variable of interest, *urban farm*, is significant and negative for the main effect indicating that college-age millennials would rather shop for tomatoes and tomato pasta sauce at the grocery store. Both products are preferred when carrying labels for being locally and organically produced (main effects). *Travel time*, not surprisingly, is preferred to be shorter rather than longer for both products.

Looking at the interaction effects, we find differences between the products. The coefficient for the interaction effect for tomatoes labeled as being *local* and *organic* is significant and negative—this is not significant for tomato pasta sauce. The interaction effect indicating that food labeled as *local* are sold at a *farmers market* is significant and negative for both, tomatoes and tomato pasta sauce. The interaction effects for *urban farms* are not significant. This means that it is not relevant for college-age millennials whether urban farms' products are labeled as organic or local. However, there is some heterogeneity in preferences, as displayed by significant standard deviation parameters.

For both products, the main standard deviation coefficient for *urban farm* tomatoes and tomato pasta sauce is significant. This means that there are college-age millennials that do prefer urban farm tomatoes and tomato pasta sauce. Also, for tomato pasta sauce the standard deviation for the interaction effect for *local* tomato pasta sauce sold at *urban farms* is significant. Other significant standard deviations coefficients are *organic* and *travel time* for both tomatoes and pasta sauce, indicating heterogeneity

TABLE 3 | Mixed logit model estimation results for tomatoes.

	Coefficient	SE	z-value	Coefficient	SE	z-value	Coefficient	SE	z-value	Coefficient	SE	z-value
Price (M)	−0.696 ***	0.034	−20.470	−0.692 ***	0.035	−19.790	−0.682 ***	0.034	−19.870	−0.692 ***	0.035	−19.730
Farmers market (M)	−0.150	0.111	−1.350	−0.072	0.176	−0.410	0.069	0.153	0.450	0.131	0.195	0.670
Urban farm (M)	−0.683 ***	0.118	−5.790	−0.829 ***	0.172	−4.820	−0.660 ***	0.169	−3.910	−0.815 ***	0.216	−3.760
Organic (M)	0.712 ***	0.116	6.130	0.916 ***	0.197	4.660	0.860 ***	0.137	6.260	0.904 ***	0.199	4.550
Local (M)	0.186 *	0.098	1.890	0.440 ***	0.141	3.120	0.606 ***	0.178	3.400	0.665 ***	0.181	3.670
Travel time (M)	−0.161 ***	0.011	−14.460	−0.164 ***	0.011	−14.740	−0.165 ***	0.011	−14.560	−0.167 ***	0.012	−14.460
Local*organic (M)				−0.443 **	0.193	−2.300	−0.357 *	0.190	−1.870	−0.420 **	0.194	−2.170
Farmers market* organic (M)				−0.177	0.220	−0.800				−0.146	0.227	−0.640
Farmers market* local (M)							−0.619 ***	0.230	−2.690	−0.600 ***	0.230	−2.600
Urban farm* organic (M)				0.169	0.232	0.730				0.224	0.231	0.970
Urban farm* local (M)							−0.127	0.213	−0.600	−0.089	0.216	−0.410
None (M)	−3.938 ***	0.251	−15.710	−3.835 ***	0.278	−13.810	−3.714 ***	0.267	−13.890	−3.821 ***	0.280	−13.670
Farmers market (SD)	0.289	0.264	1.100	0.337	0.247	1.360	0.412 **	0.207	1.990	0.132	0.467	0.280
Urban farm (SD)	0.521 ***	0.191	2.720	0.476 **	0.210	2.260	0.509 **	0.205	2.490	0.564 ***	0.216	2.610
Organic (SD)	0.938 ***	0.139	6.770	0.789 ***	0.167	4.730	0.801 ***	0.157	5.110	0.764 ***	0.164	4.670
Local (SD)	0.289	0.205	1.410	0.012	0.270	0.050	0.010	0.254	0.040	0.076	0.281	0.270
Travel time (SD)	0.095 ***	0.011	8.460	0.092 ***	0.010	9.280	0.093 ***	0.010	9.300	0.095 ***	0.010	9.790
Local*organic (SD)				0.837 **	0.220	3.810	0.814 ***	0.211	3.860	0.715 ***	0.265	2.700
Farmers market* organic (SD)				0.271	0.344	0.790				0.594 ***	0.223	2.670
Farmers market* local (SD)							0.116	0.427	0.270	0.252	0.379	0.660
Urban farm* organic (SD)				0.223	0.466	0.480				0.053	0.558	0.090
Urban farm* local (SD)							0.189	0.333	0.570	0.224	0.347	0.640
None (SD)	1.840 ***	0.206	8.950	2.027 ***	0.222	9.120	2.031 ***	0.222	9.160	1.901 ***	0.203	9.350
Log–likelihood	−1602.504			−1595.434			−1592.586			−1590.021		
McFadden pseudo R–squared	0.357			0.360			0.361			0.362		

*** , ** , and * denote statistically significant differences at 1%, 5% and 10%, respectively.

SE, Standard Error.

TABLE 4 | Mixed logit model estimation results for tomato pasta sauce.

	Coefficient		SE	z–value	Coefficient		SE	z–value	Coefficient		SE	z–value	Coefficient		SE	z-value
Price (M)	−0.469	***	0.022	−21.370	−0.464	***	0.022	−20.650	−0.468	***	0.023	−20.670	−0.469	***	0.023	−20.440
Farmers market (M)	−0.029		0.088	−0.330	0.031		0.132	0.240	0.137		0.120	1.130	0.168		0.152	1.100
Urban farm (M)	−0.313	***	0.083	−3.750	−0.247	**	0.120	−2.060	−0.359	***	0.126	−2.850	−0.280	*	0.156	−1.800
Organic (M)	0.494	***	0.081	6.110	0.692	***	0.141	4.920	0.621	***	0.100	6.240	0.672	***	0.142	4.730
Local (M)	0.453	***	0.075	6.080	0.541	***	0.101	5.340	0.696	***	0.131	5.330	0.687	***	0.134	5.150
Travel time (M)	−0.112	***	0.007	−15.840	−0.114	***	0.007	−15.660	−0.114	***	0.007	−15.610	−0.113	***	0.007	−15.490
Local*organic (M)					−0.241	*	0.140	−1.720	−0.265	*	0.142	−1.870	−0.236		0.144	−1.640
Farmers market* organic (M)					−0.097		0.159	−0.610					−0.060		0.161	−0.370
Farmers market* local (M)									−0.481	***	0.170	−2.840	−0.498	***	0.171	−2.900
Urban farm* organic (M)					−0.172		0.161	−1.070					−0.155		0.163	−0.960
Urban farm* local (M)									−0.004		0.162	−0.030	−0.004		0.161	−0.030
None (M)	−2.965		0.180	−16.480	−2.863	***	0.203	−14.120	−2.964	***	0.196	−14.580	−2.903	***	0.210	−13.810
Farmers market (SD)	0.600	***	0.128	4.680	0.592	***	0.126	4.700	0.620	***	0.133	4.680	0.637	***	0.132	4.810
Urban farm (SD)	0.488	***	0.148	3.290	0.458	***	0.148	3.110	0.403	**	0.177	2.280	0.449	***	0.155	2.900
Organic (SD)	0.800	***	0.098	8.160	0.641	***	0.115	5.590	0.634	***	0.122	5.190	0.631	***	0.123	5.150
Local (SD)	0.471	***	0.144	3.270	0.202		0.320	0.630	0.087		0.536	0.160	0.134		0.232	0.570
Travel time (SD)	0.074	***	0.007	11.150	0.078	***	0.008	10.220	0.077	***	0.007	10.870	0.077	***	0.007	10.760
Local*organic (SD)					0.858	***	0.154	5.580	0.927	***	0.143	6.500	0.870	***	0.138	6.320
Farmers market* organic (SD)					0.0526		0.234	0.230					0.298		0.254	1.170
Farmers market* local (SD)									0.372		0.332	1.120	0.359		0.360	1.000
Urban farm* organic (SD)					0.009		0.200	0.050					0.042		0.205	0.210
Urban farm* local (SD)									0.479	**	0.227	2.110	0.460	**	0.218	2.110
None (SD)	1.768	***	0.159	11.120	1.793	***	0.161	11.160	1.794	***	0.172	10.400	1.813	***	0.157	11.540
Log–likelihood			−2986.976				−2977.597				−2971.526				−2964.087	
McFadden pseudo R-squared			0.236				0.239				0.240				0.242	

*** , ** , and * denote statistically significant differences at 1%, 5% and 10%, respectively.

SE, Standard Error.

TABLE 5 | Mean willingness to pay estimates.

	Tomatoes $/lb		Tomato pasta sauce $/24-ounce jar	
Farmers market	0.19		0.37	
Urban farm	−1.19	***	−0.58	*
Organic	1.31	***	1.43	***
Local	0.96	***	1.46	***
Travel time	−0.24	***	−0.24	***
Local*organic	−0.62	**	−0.50	***
Farmers market* organic	−0.20	***	−0.11	***
Farmers market* local	−0.87		−1.05	***
Urban farm* organic	0.32	*	−0.33	**
Urban farm* local	−0.13		−0.02	***

***, **, and * denote statistically significant differences at 1%, 5%, and 10%, respectively.

in preferences. Furthermore, there is preference heterogeneity for the interaction effect of *organic* and local for both products, as well as for *farmers market* for pasta sauce, and organic tomatoes sold at *farmers markets*.

Willingness-to-Pay

Next, **Table 5** shows the WTP per pound of tomatoes and 24oz jar of tomato pasta sauce. Most of the WTP estimates for both products are similar in sign and significance, however, we do find a difference in magnitude between tomatoes and tomato pasta sauce. While WTP is not significant for *farmers market,* it is significantly negative for *urban farm,* indicating that college-age millennials would only consider purchasing fresh tomatoes and tomato pasta sauce at an urban farm if prices were lower than at the grocery store (grocery store serves as point of sale reference category).

Findings for *local* and *organic* labeling show a significant and positive WTP, all else constant, suggesting that college-age millennials would pay more for local or organic tomatoes and tomato pasta sauce. This is in line with previous studies (Hu et al., 2009; Yue and Tong, 2009; Costanigro et al., 2011; Onozaka and Thilmany-McFadden, 2011; Carroll et al., 2013). For *Travel Time* we find a significant and negative WTP indicating that longer distances to the point of sale decreases college-age millennials' WTP. This matches previous research that showed the value for convenient shopping locations (Bell and Lattin, 1998; Leszczyc et al., 2000).

As for the interaction effects, results for *organic* tomatoes and pasta sauce sold at the *farmers market* show a lower WTP indicating that college-age millennials discount the products. The same is found for *organic* pasta sauce sold at *urban farms*. That said, the WTP for *organic* tomatoes sold at an *urban farm* is positive. This means that urban farms could realize a premium when selling organic tomatoes in the amount of $0.44 (-$1.19 + $1.31 + $0.32). Compared to the significant and negative WTP (−$1.19) when tomatoes are sold at the *Urban Farm* this is quite large (this is in comparison to the baseline, which is the grocery store). Also, we find a significant and negative interaction effect for tomato sauce labeled as *locally* produced and sold at either the

farmers market or the *urban farm*. This might stem from the fact that college-age millennials do not necessarily expect processed products to be sold at these outlets and might be unsure of the value. Uncertainty has been associated with lower WTP.

When products were labeled as *locally* and *organically* produced WTP significantly decreased, which means that college-age millennials would pay less for tomatoes and tomato pasta sauce that is certified as being local and organic.

CONCLUSION

In this research we investigate if college-age millennials are willing to pay a premium for processed and unprocessed food sold at competing points of sale, including urban farms. In addition, we examine if this premium is affected by the convenience of the shopping venue, as well as, by being labeled as locally and organically grown.

Results from two online choice experiments show that college-age millennials are willing to pay a premium for local food. However, the positive WTP for local food is not attached to the point of sale. While one could assume that urban farms have an advantage selling the ultimate local food, we do not find positive WTP for food sold directly at urban farms. In other words, millennials in our study do not prefer direct channels over grocery stores to buy local food, instead WTP declines for processed food labeled as local sold at farmers markets and urban farms. Reasons for this could be the attitude that these venues cater to price conscious consumers, or that less financial input is required when growing, processing, and selling is done in one place. Moreover, the negative WTP for local tomato pasta sauce at farmers market or urban farm could be explained with the expectation that processed local food at farmers markets and urban farms should be more affordable (McGarry-Wolf et al., 2005; McCormack et al., 2010).

Similarly, the discount for organic tomatoes and pasta sauce sold at the farmers market and for tomato pasta sauce sold at urban farms might suggest that consumers believe that products sold at farmers markets are of inferior quality, e.g., they do not carry the premium brands available at grocery stores. On the other hand, the millennials we studied have a positive WTP for organically produced items at urban farms. Hence, selling organic products might be economically beneficial for urban farms. Those producing organically might benefit from adding a label that indicates local production given the positive WTP we find. Therefore, while urban farms may not be able to charge higher prices, focusing on these labels could be valuable when advertising their products.

Our results can be used by fresh produce growers, processed food manufacturers, retailers and legislators who seek to influence urban farm sales. We find that college-age millennials do not have a strong preference for urban farms, as distributors compared to grocery stores, and are not willing to pay a premium. On the contrary, they are willing to pay less at urban farms. Also, we provide evidence that college-age millennials have lower preferences and WTP for local products sold at farmers markets, while their preferences and WTP for products at urban farms

do not depend on the fact that the food sold there is local. However, longer travel distances could become an obstacle for urban farms that try to sell their products on or near their premises, if they have a remote location. Bringing their products closer to customers or offering additional shopping experience, e.g., light shows during the holidays, corn labyrinth, could help urban farms to offset the travel distance.

There are some limitations to our research. First, we focus on college-age millennials with a convenience sample of college students being on average 22 years old. This means they are among the youngest millennials, whereas the oldest millennials are 40 years old. Also, we focus exclusively on college students not taking into account millennials without a college education. Future studies could expand the sample by focusing on older millennials and on those without a college degree. That said, we believe that college-age millennials are a valuable target group as their food preferences are important to understand in order to prepare our food systems for the future demand of this consumer segment. We consider this group to be highly influential in terms of future food consumption, especially since they soon will move on to higher paying jobs.

Second, this research studies participants in a certain region. Expanding to other research locations might be valuable. In addition, we only tested preferences for tomatoes and tomato pasta sauce. Future research could expand the variety of processed and unprocessed food products. For instance, we only investigated plant products, animal products or more processed products with a lot of ingredients, e.g., pizza could lead to more detailed findings.

Third, we did not introduce consumer characteristics, such as attitudes, knowledge and perception, into our choice models. Since we already included interaction effects between the choice attributes, introducing additional controls would lead to triple interaction effects. Future research could abstain from interactions between the attributes and research underlying effects of preferences for urban farm food. It is possible that college-age millennials are not used to visit urban farms when shopping for food given their budget is more constrained. As a result, they might be less experienced with these outlets, which could explain the discount effect for food sold at direct marketing channels.

Finally, future research could investigate the fact that college-age millennials have a positive WTP for organic food from urban farms. It might be valuable to conduct a cost benefit analysis regarding costs of organic certification needed by those urban farms. However, consumers may not have the knowledge to differentiate between local and organic production, since they often believe local food is organically produced. Thus, more education might be necessary to capitalize on the organic production.

DATA AVAILABILITY STATEMENT

All datasets generated for this study are included in the article/**Supplementary Material**.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Internal Review Board of Arizona State University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

IP contributed to conception and design of the study, organized the database, performed the analysis, and wrote the first draft of the manuscript. CG served as secondary writer of the manuscript and contributed to conception and study design. All authors contributed to manuscript revision, read and approved the submitted version.

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SUPPLEMENTARY MATERIAL

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Supplementary Table 1 | Data set for tomato pasta sauce.

Supplementary Table 2 | Data set for tomatoes.

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