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[Article title]

Food choice in the e-commerce era: A comparison between Business-To-Consumer (B2C), Online-To-Offline (O2O) and New Retail

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Food choice in the e-commerce era: A comparison between Business-To-Consumer (B2C), Online-To-Offline (O2O) and New Retail

Structured Abstract:

Purpose: This study associated consumers' food choice motives and socio-demographic characteristics with their attitudes and consumptions towards food shopping with four e-commerce modes: Business-To-Consumer (B2C), Online-To-Offline Delivery (O2O Delivery), Online-To-Offline In-store (O2O In-store) and New Retail. It also explored consumer preferences for specific food categories within the four e-commerce modes.

Design/methodology/approach: An online survey was administered to 954 participants from three Chinese cities: Beijing, Shanghai and Shenzhen. Descriptive analysis and linear regression were used in the data analysis.

Findings: The following food choice motives (FCMs) and socio-demographic characteristics had a significant effect on food e-commerce attitudes and/or consumption, with some or all of the four e-commerce modes: Taste Appeal, Value for Money, Safety Concerns, Quality Concerns, Processed Convenience, Purchase Convenience, Others' Reviews, City, Gender, Household Size, Age, Income, Occupation, and Marital Status. Consumers also have different consumption preferences for food categories in the four e-commerce modes.

Originality/value: This is the first study to associate consumer FCMs and socio-demographics with their e-commerce attitudes and consumption regarding food in four e-commerce modes: B2C, O2O Delivery, O2O In-store and New Retail.

Keywords: consumer; e-commerce, B2C, O2O, New Retail, food choice

Introduction

The rapid development of e-commerce is changing the food consumption patterns of consumers, as more and more people consider food purchase through various e-commerce modes, including, Business-to-Consumer (B2C) food shopping, Online-To-Offline Delivery (O2O Delivery) and in-store (O2O In-store) meal services, and new retail (Amir and Rizvi, 2017; Xiao et al., 2018; Wang and Somogyi, 2018).

B2C food shopping is a process that allows consumers to purchase and make payment for food products directly from business-sellers through B2C e-commerce platforms (e.g. *Amozon.com*, and China's *JD.com* and *Tmall.com*), where the food products are delivered to consumers (CIW Team, 2018; Gefen and Straub, 2004; Mokhtarian, 2004). As a traditional mode of e-commerce for food purchase, B2C food shopping had global sales of 74. 13 billion US dollars in 2016, with an annual growth rate of 19.4% from 2012 to 2016 (Agriculture and Agri-Food Canada, 2017). Packaged food dominated sales and consumers' preferences for food categories for B2C food shopping. For example, this trend is seen in baby food, snacks and dairy products (Agriculture and Agri-Food Canada, 2017; Chu et al., 2010; Lau et al., 2015; Wang and Somogyi, 2018). China plays an important role in the global B2C food market, amassing sales of 23.91 billion US dollars in 2016 with a dramatic annual growth rate of 52.9% from 2012 to 2016 (Agriculture and Agri-Food Canada, 2017; Wang and Somogyi, 2018).

Researchers have conducted a number of studies related to the behaviour of food consumers in the B2C platform in the last decade or so (Wang and Somogyi, 2018). Many of the studies either fully or partly confirmed the significant effects of innovation-adoption characteristics (perceived social norm, perceived incentive, perceived complexity, perceived relative advantage, perceived compatibility, and perceived risk) on consumer attitudes, behaviours or behaviour intentions regarding B2C food purchase (Anesbury et al., 2016; Bryła, 2018; Kang et al., 2016; Kaur and Shukla, 2016; Morganosky and Cude, 2000; Mortimer et al., 2016; Hansen et al., 2004; Hansen, 2008; Ramus and Asger Nielsen, 2005; Wang and Somogyi, 2018; Sreeram et al., 2017; Yeo et al., 2017; Zhao et al., 2017). Some of these studies indicated the significant effect of choice motives (e.g. convenience, quality concern and price), consumer segments (e.g. frequent and non-frequent online shoppers), socio-demographic characteristics (e.g. income, marital status and occupation), reference effect (e.g. others' reviews), and food categories (e.g. packed food and fresh food) on consumer adoption of the B2C platform for food purchase (Chintagunta et al., 2012; Chu et al., 2010; Degeratu et al., 2000; Hansen, 2005; Hansen, 2008; Heng et al., 2018; Jin et al., 2017; Kang et al., 2016; Kaur and Shukla, 2016; Morganosky and Cude, 2000; Mortimer et al., 2016; Ramus and Asger Nielsen, 2005; Wang and Somogyi, 2018a; b; Wang et al., 2019; Zhao et al., 2017).

With one fifth of the world's mobile phone users and a high saturation of smartphone and mobile payment, China is leading the revolution in e-commerce food consumption, with the explosion of the O2O catering industry (Cho et al., 2018; Xiao et al., 2018). China's O2O food catering sales reached 102.2 billion US dollars in 2017, with a staggering annual growth rate in excess of 70% from 2013 to 2017 (iResearch, 2018). Unlike food sales on B2C platforms, O2O platforms focus on catering services (Xiao et al., 2018). There are two types of O2O platforms in China: O2O Delivery platforms and O2O in-store platforms. Chinese consumers mainly use O2O Delivery platforms (e.g. *Waimai.meituan.com*, *Ele.me* and *Waimai.baidu.com*) to order and to make payment for meals from local restaurants or other food service sectors, with those meals delivered to them (Chen, 2018; Ritchie et al., 2013). Recently, global internet giants are trying to copy China's success of the O2O Delivery food shopping to other countries (e.g. Uber Eats) (Eadicicco, 2019). Regarding the O2O In-store platforms (Meituan.com, Koubei.com, Dianping.com or Nuomi.com), Chinese consumers also mainly order local catering services (e.g. meals and restaurant seats) from it but offline consume it at food service sectors (e.g. restaurants and hotels) (Chen, 2018; Ritchie et al.,

2013). There are many e-commerce platforms with similar functions globally (e.g. TripAdvisor.com and Yelp.com).

Only a few studies could be found related to food consumer behaviour on the O2O mode, all published in recent years and half using Chinese consumers in their research samples due to the major market size and quick development of the O2O catering industry in China (Cho et al., 2018; Xiao et al., 2018). More studies focus on the consumer adoption of food shopping with the O2O delivery mode than that of the O2O in-store mode. The O2O in-store food shopping is significantly influenced by consumer trust, perceived social norms and perceived complementarity, others' reviews, performance expectancy of apps, hedonic motivation, and price saving motivations (Alalwan, 2020; Xiao et al. 2017; 2018). The O2O delivery food shopping is significantly affected by perceived usefulness, perceived value, perceived ease of use, mobile anxiety (non-rational feelings and impressions originated from previous difficulties when use mobile hardware or software), price, trust, food variety, app design, convenience, hedonic motivation, social norm, online purchase experience, household size, food quality, delivery efficiencies, information quality and others' reviews (Cho et al., 2018; He et al., 2018; Kang and Namkung, 2019; Lee et al., 2019; Ray et al., 2019; Roh and Park, 2019; Suhartanto et al., 2019; Wu et al., 2015; Xu and Huang, 2019).

In recent years, a new e-commerce mode called New Retail has started to appear across the world, which is defined as: '*a consumer-centric mode of retailing that relies on advanced technologies to upgrade the process of production, circulation and sales for retailing ecosystems*' (Zhang et al., 2018). The New Retail e-commerce mode is an updated version of the O2O e-commerce mode: the O2O e-commerce digitalises traditional offline food service sectors with information technologies for mobile payment and ordering (Chen, 2018; Ritchie et al., 2013); the New Retail e-commerce mode digitalises traditional offline retail stores with more information technologies such as big data, cloud computing, the Internet of Things, mobile payment and artificial intelligence (Ding et al., 2018; Tung, 2017; Walton, 2018; Zhang et al., 2018). Major e-commerce giants are aggressively investing in this new business mode and have opened New Retail stores such as Amazon Go and Alibaba's Fresh Hema (Ding et al., 2018; Tung, 2017; Zhang et al., 2018). Alibaba is a pioneer of the New Retail food mode and has opened nearly 60 Fresh Hema stores in China's large cities since 2016, providing "three-in-one" service including, online delivery, in-store purchase, and in-store cooking and dining, in particular for fresh food products such as seafood, meat and vegetables (Mitchell, 2018; Peterson, 2018). There are few similar New Retail food stores in other parts of the world. To our knowledge, there has been no study related to food consumer behaviour regarding the New Retail mode. This is probably because New Retail is a relatively new e-business mode and it is still embryonic as an academic research topic.

There is a general currently a lack of understanding regarding consumer perceptions, motives, attitudes, categorical preferences, and behaviours towards e-commerce food shopping. Particularly for the O2O and New Retail modes and consequently there are a number of questions that need to be answered: What are the important motives and the similarities and differences between food consumption using different e-commerce modes? What are the most popular categories and significant socio-demographics of O2O delivery, O2O in-store and New Retail mode food consumers, and the similarities and differences between those modes and the B2C mode?

In order to address the knowledge gaps, this study will attempt to explore significant influences of consumers' Food Choice Motives (FCMs) and socio-demographics on their attitudes and consumptions towards purchasing food through the B2C, O2O Delivery, O2O In-store and New Retail modes. It will also explore the favourite food categories of consumers for each of the four e-commerce modes.

Hypothesis

Previous studies have indicated many important motives for people's daily food choices, for example convenience, sensory appeal, price and food safety concerns (Brunner et al., 2010; Honkanen and Frewer, 2009; Lindeman and Väänänen, 2000; Steptoe et al., 1995; Wang et al., 2015). Scholars have examined the associations between these FCMs and a wide variety of dietary attitudes, behaviours, and behaviour intentions. For example, consumer attitudes and consumption towards traditional food, European food, sustainable food concerns, the adoption of personalised nutrition, social network related diet-quality, and the food choices of athletes at international competition events (e.g. Baudry et al., 2017; Kim, 2016; Pelly et al., 2018; Pieniak et al., 2009; Rankin et al., 2018; Wang et al., 2015). There is still, however, a lack of understanding about the associations between food choice motives and e-commerce food consumption behaviour (in particular for O2O and New Retail modes).

Those studies have proven that consumer FCMs have direct effects on consumer dietary attitudes, consumptions or consumption intentions, and indirect effects on consumer dietary consumption or consumption intentions through their attitudes towards food products or services (Rankin et al., 2018; Pieniak et al., 2009). Consumer attitudes comprise their total evaluation (positive or negative) of a food product or service and have direct effects on their consumption or consumption intentions towards the food product (Rankin et al., 2018; Pieniak et al., 2009).

Previous studies of e-commerce food consumption have confirmed the significant effects of some consumer choice motives on their attitudes, consumption or consumption intentions towards food purchase via B2C and/or O2O platforms including innovation-adoption characteristics, convenience, price, others' reviews, appearance, quality concern, trust, perceived social norms, perceived complementarity, environmental concerns and food variety (Cho et al., 2018; Chintagunta et al., 2012; Chu et al., 2010; Degeratu et al., 2000; Hansen, 2005; Hansen, 2008; Heng et al., 2018; Jin et al., 2017; Kang et al., 2016; Morganosky and Cude, 2000; Mortimer et al., 2016; Ramus and Asger Nielsen, 2005; Wang and Somogyi, 2018; Xiao et al., 2017; 2018; Wu et al., 2015; He et al., 2018; Zhao et al., 2017).

A total of ten FCMs were included as variables in this study, for the construct of consumer FCMs related to their food consumption through the different e-commerce modes: Taste Appeal, Value for Money, Cheap, Variety, Safety Concerns, Quality Concerns, Processed Convenience, Purchase Convenience, Others' Reviews and Discount. These FCMs were selected and developed based on a literature review and a qualitative study. Prior to this quantitative study, an online qualitative survey (n=205) was conducted to qualitatively examine consumer choice motives for food consumption via the different e-commerce modes. A questionnaire was randomly distributed across China among registered members of a sample panel from a Chinese research agency during April 2018. Three open-ended questions were used to explore the motives for participant choices when consuming food via China's dominant B2C, O2O Delivery and O2O In-store platforms (Chen, 2018; CIW Team, 2018; Ritchie et al., 2013). For instance, "1) In your opinion, why do people purchase food products through Tabao.com, Tmall.com or JD.com*?;* 2) In your opinion, why do people order meals or purchase food products through Waimai.meituan.com, Ele.me or Waimai.baidu.com*?;* and 3) In your opinion, why do people order meals or purchase food products through Meituan.com, Koubei.com, Dianping.com or Nuomi.com, via online ordering and offline consuming at restaurants, supermarkets or other business locations*?*" New Retail was not involved in the qualitative survey because it is a relatively new business mode and only consumers in some of the largest Chinese cities have food consumption experiences with it. For example, Alibaba has opened most of its Fresh Hema stores in China's big cities such as Beijing, Shanghai and Shenzhen (Mitchell, 2018; Peterson, 2018). The responses were analysed using content analysis which was broken into text-fragments and later grouped into word-codes and named

(Berelson, 1952; Ritchie et al., 2013). The ten FCMs were developed based on: 1) the relevant word-codes appearing in the answers of at least ten participants to the questions about B2C (including: convenience, wide-variety, low-price, good-value-for-money, discount and quality-assured), O2O Delivery (including: convenience, low-price, good-value-for-money, wide-variety and *delicious*) and/or O2O In-store (including: convenience, low-price, discount, good-value-for-money, discounts, others-reviews, delicious and quality-assured) modes; and 2) that which was related to choice motives in the FCM literature or the e-commerce food consumer behaviour noted above.

The qualitative consumer study also explored participants' consumption preferences for food categories in different e-commerce modes. They were asked to indicate three specific food products or meals that they most frequently purchased or ordered through the major Chinese B2C, O2O Delivery and O2O In-store platforms. The responses were grouped into food or meal categories for each of the three e-commerce modes. Also, a number of categories, shown in Table 1, were selected in this study to explore the food category preferences for the three e-commerce modes , based on the most frequently used categories and a review of food or meal products in the apps of major Chinese B2C, O2O Delivery and O2O In-store platforms. Table 1 also shows the food categories for the New Retail mode, which were selected by reviewing food products in the app of China's major New Retail store, Fresh Hema (Mitchell, 2018; Peterson, 2018).

Previous studies have also indicated the significant effects of socio-demographics on consumer dietary attitudes, consumption or consumption intentions (Sun, 2008; Verbeke, 2015). Some socio-demographics were confirmed to have significant effects on food consumer behaviours via B2C and/or O2O platforms, including, income, age, marital status, gender, education, household size and occupation (Cho et al., 2018; Hansen, 2005; Jin et al., 2017; Kang et al., 2016; Kaur and Shukla, 2016; Morganosky and Cude, 2000; Wang and Somogyi, 2018).

Therefore, consumer food choice motives and socio-demographics are assumed to directly affect their attitudes towards food consumption in the four e-commerce modes. Four hypothesis (H) were developed for each of the four e-commerce modes, as follows:

H1: A consumer's food choice motives and socio-demographics have significant effects on their attitudes towards food consumption in the B2C e-commerce mode (B2C attitudes).

H2: A consumer's food choice motives and socio-demographics have significant effects on their attitudes towards food consumption via the O2O Delivery e-commerce mode (O2O Delivery attitudes).

H3: A consumer's food choice motives and socio-demographics have significant effects on their attitudes towards food consumption via the O2O In-store e-commerce mode (O2O In-store attitudes).

H4: A consumer's food choice motives and socio-demographics have significant effects on their attitudes towards food consumption via the New Retail e-commerce mode (New Retail attitudes).

In addition, food choice motives, socio-demographics and food e-commerce attitudes are expected to have a direct effect on e-commerce food consumption in the four e-commerce modes. Other four hypothesis were developed for each of the four e-commerce modes as follows:

H5: A consumer's food choice motives, socio-demographics and B2C attitudes have significant effects on their food consumption via the B2C e-commerce mode (B2C consumption).

H6: A consumer's food choice motives, socio-demographics and O2O Delivery attitudes have significant effects on their food consumption via the O2O Delivery e-commerce mode (O2O Delivery consumption).

H7: A consumer's food choice motives, socio-demographics and O2O In-store attitudes have significant effects on their food consumption via the O2O In-store e-commerce mode (O2O In-store consumption).

H8: A consumer's food choice motives, socio-demographics and New Retail attitudes have significant effects on their food consumption via the New Retail e-commerce mode (New Retail consumption).

>> Insert Table 1

Methods and materials

Participants and procedures

The data for this study was collected through an online quantitative survey in May 2018. A questionnaire was developed in English and translated into Chinese. The questionnaire consisted of two main sections: first, motivational, attitudinal and behavioural items related to e-commerce food shopping (used in this study); second, motivational and behavioural items related to luxury seafood consumption (published in Wang and Somogyi, 2020). An online pre-test (n=52) was conducted with Chinese participants who were registered members on the panel of a Chinese research agency, in order to improve the language expression and question design. The final questionnaire was distributed in three Chinese cities, Beijing, Shanghai and Shenzhen, through the same sample panel. Participants were required to give consent for their participation online before being given the survey questions. The data collected was kept in a non-identifiable file and processed anonymously. Only those participants who had purchased food via the B2C, O2O Delivery and O2O In-store platforms in the past were retained as valid participants of this study and were shown the full questions. All valid participants received a monetary incentive from the Chinese research agency. These three cities were selected because they have the most Fresh Hema stores and are therefore more likely to have a number of consumers who have experienced New Retail (a relatively new business mode) than other Chinese cities (Mitchell, 2018; Peterson, 2018).

A total of 954 valid samples were obtained for this study, 319 from Beijing, 326 from Shanghai and 309 from Shenzhen. The participants all had food consumption experiences with B2C, O2O Delivery and O2O In-store platforms. 45.6% (n=435) had consumed food from New Retail stores (Fresh Hema). Shanghai had a higher percentage of participants with New Retail food consumption experiences (62.3%) than Beijing (42.6%) and Shenzhen (31.0%), presumably because Shanghai has more Fresh Hema stores (n=20) than Beijing (n=16) and Shenzhen (n=10) (current to August 2018, please refer to the official website of Fresh Hema, available at https://www.freshhema.com/). Table 2 shows the socio-demographics of the total sample and the sub-samples of the three cities.

>> Insert Table 2

Measures

Participant FCMs were measured with ten items, shown in Table 3. The items were developed based on the qualitative study and previous studies related to FCM and e-commerce food consumer behaviour (see Section 2) (Cho et al., 2018; Kang et al., 2016; Pieniak et al., 2009; Zhao et al., 2017). Participants were required to assess the importance of the ten items in their daily dietary choices as: "It is important to me that the food/meal I eat on a typical day [each of the items*]*" and on seven-point Likert agreement scales from "7=Totally agree*"* to "1= Totally disagree". Table 3 also shows the correlation matrix of the ten FCM variables. All correlation coefficients were lower than 0.65. There was no severe multi-collinearity in this FCM construct (Pieniak et al., 2009).

>> Insert Table 3

Participant attitudes towards food consumption via different e-commerce modes were measured by four items, respectively: "**1) B2C attitudes**- When I think about purchasing food from online shops (e.g. Taobao.com, Tmall.com and JD.com), I feel …; **2) O2O Delivery attitudes**: When I think about ordering meals through take-away apps (e.g. Waimai.meituan.com, Ele.me or Waimai.baidu.com) and physically eat them at my home or workplace, I feel …; **3) O2O In-store attitudes**: When I think about ordering meals through group-buying apps (e.g. Meituan.com, Koubei.com, Dianping.com or Nuomi.com) and physically consume them at restaurants, hotels and food stalls, I feel…; **4) New Retail attitudes**: When I think about purchasing food from Fresh Hema, I feel …" and on seven-point semantic differential scales with the bipolar adjectives: "unhappy/happy". The approach was developed from previous studies that explored consumer attitudes towards different food products and food purchase via e-commerce (Pieniak et al., 2009; Wang and Somogyi, 2018).

Participant food consumption via different e-commerce modes was measured using four self-reported items: "**1) B2C consumption**: To what extent do you consider yourself a consumer who purchases food from online shops (e.g. Taobao.com, Tmall.com and JD.com)? **2) O2O Delivery consumption**: To what extent do you consider yourself a consumer who orders meals using take-away apps (Waimai.meituan.com, Ele.me or Waimai.baidu.com)? **3) O2O In-store consumption**: To what extent do you consider yourself a consumer who orders, makes payment or uses e-coupon using group-buying apps (e.g. Meituan.com, Koubei.com, Dianping.com or Nuomi.com) and physically eats meals/foods at food service providers (e.g. restaurants, hotels and food stall)? **4) New Retail consumption**: To what extent do you consider yourself a consumer who purchases food products from Fresh Hema?" and on seven-point Likert scales ranging from "1= Not at all" to "7= Very much". This approach was developed from previous studies that examined consumer consumption towards different food products (Pieniak et al., 2009).

Participants were also asked to indicate their three most frequently consumed food/meal categories over the past year for each of the four e-commerce modes based on the food/meal selection categories shown in Table 1. The food selection categories were developed from the qualitative study and a review of food categories on the apps of China's major e-commerce platforms (see Section Hypothesis).

Data analysis

The statistical software tools SPSS 24.0 and Stata 14.0 were used to perform analyses in this study. The analyses were conducted with the total sample (n=954) for the B2C, O2O Delivery and O2O In-stores hypothesis (**H 1-3** and **5-7**), and with the sub-sample who had New Retail food consumption experiences (n=435) for the New Retail hypothesis (**H 4** and **8**). Linear regression analyses were undertaken for the eight specific exploratory hypothesis (see Section

2) in line with the linear nature of the dependent variables, consumer food consumption via different e-commerce modes and their attitudes towards e-commerce consumption (Darlington and Hayes, 2016). Three categorical variables were dummy coded including City- City1 (Beijing=1, Shanghai=0, Shenzhen=0) and City2 (Beijing=0, Shanghai=1, Shenzhen=0), Marital status- Marital status1 (Married=1, With a partner=0, Single=0) and Marital status 2 (Married=0, With a partner=1, Single=0), and Occupation- Occupation1(Managing employee=1, Salaried employee=0, Student=0, Other=0), Occupation2 (Managing employee=0, Salaried employee=1, Student=0, Other=0) and Occupation3 (Managing employee=0, Salaried employee=0, Student=1, Other=0) (Alkharusi, 2012). Descriptive analyses (by mean values) were then undertaken to identify differences between e-commerce consumption and attitudes between the categorical socio-demographic groups with significant relationships to the dependent variables in the linear regression analyses. Thirdly, descriptive analyses (by percentage of total sample) were carried out to understand the food/meal categories most frequently consumed by participants in the past year, for each of the four e-commerce modes.

Results

Table 4 shows results of the linear regression analysis for the eight Hypotheses used to explore the effects of consumers' motives and socio-demographics on their e-commerce food attitudes and consumptions with the four modes. Table 5 shows the results of the descriptive analyses exploring the differences between categorical socio-demographic groups that have a significant influence on the e-commerce food attitudes and consumptions in the linear regression analyses. These are City, Marital status and Occupation. Figure 1 shows the results of the descriptive analyses of participants the most frequently consumed food categories in the past year for each of the four e-commerce modes. The following section will summarize these results for each e-commerce mode.

>> Insert Figure 1
>> Insert Table 4
>> Insert Table 5

Food choice with the B2C mode

B2C attitudes have a significantly negative relationship with the FCM: *Value for money* and positive relationships with four FCMs *Safety concern*, *Quality concern*, *Purchase convenience* and *Others' reviews* (**H1**). In other words, participants who attach more significance to the food consumption concerning quality, safety, purchase convenience and others' reviews, have more positive attitudes towards B2C food shopping than other participants. While those participants, who attach more significance to food consumption with value for money, have more negative attitudes towards B2C than other participants. Furthermore, the B2C attitudes also have significant relationships with socio-demographic characteristics: City1 and Age. The B2C attitudes are negatively linked to age. Table 5 indicates that the B2C attitude variables for Shanghai and Beijing have similar mean values that are higher than the value for Shenzhen. Therefore those participants who live in Beijing and Shanghai and are younger in age have more positive attitudes towards the B2C food shopping than Shenzhen residents and older participants.

B2C consumption has a significantly positive relationship with three socio-demographic variables *Gender (female)*, *Martial status1* and *Income*, and the variable of B2C attitudes (**H5**). It also has a significantly negative relationship with *Age*. Table 5 shows that married participants have a slightly higher mean value for B2C consumption than that for the participants with a partner or those who are single. So those participants who are female,

married, have a higher income, are younger in age or have more positive attitudes toward B2C, are more experienced with the B2C food consumption than other participants.

Figure 1 shows that snacks dominate B2C food consumption, with more than 66% of participants indicating frequent B2C snack consumption within the past year. Snacks are followed by nut and dairy products with more than 35% of participants reporting frequent B2C consumption of these food products in the past year. At a lower level, but nonetheless noteworthy, in excess of 10% of participants indicate B2C consumption of rice, cooking oil, beverage and fresh fruit during the past year.

Food choice with the O2O Delivery mode

O2O Delivery attitudes have a significantly positive relationship with two FCMs *Quality concern* and *Purchase convenience* and a socio-demographic variable *Martial status1*. While it has a negative relationship with three socio-demographic variables *Occupation3*, *Gender (female)* and *Age* (**H2**). Table 5 shows that the O2O Delivery attitude variables for married participants have a higher mean value than that for the participants that have a partner or are single. The variables of managerial or salaried employees participants have a higher mean value than that for students or participants with other occupations.

The O2O Delivery consumption has a significantly positive relationship with a FCM *Processed convenience*, an socio-demographic variable *Marital status1*, and the O2O Delivery attitudes (**H6**). It also has significantly negative relationships with an FCM *Taste appeal* and a socio-demographic characteristic *Age*. Table 5 shows that the O2O Delivery consumption variables for married participants and participants with a partner have mean values that are higher than the values for single participants.

Figure 1 indicates that Chinese "simple meal" dominates the O2O Delivery food consumption with more than 78% of participants indicating their frequent O2O Delivery consumption of it in the past year, followed by Western fast food, with over 47% of participants reporting it as part of their O2O Delivery consumption. 28% of the participants indicate their frequent O2O Delivery consumption with "non-simple meal" Chinese dish and above 10% of participants reporting consumption of beverage, Chinese traditional food, Western dishes (non-fast food) and desserts.

Food choice with the O2O In-store mode

O2O In-store attitudes have significantly positive relationships with two FCMs *Taste* appeal and *Others' reviews* and the socio-demographic variable *Occupation2* (**H3**). Table 5 shows that The O2O In-store attitudes for managerial or salaried employees participants have a higher mean value than that of students or participants with other occupations.

O2O In-store consumption has a significantly positive relationship with two socio-demographic variable *Marital status1* and *2*, and the O2O In-store attitudes. It also has significantly negative relationships with an FCM *Taste appeal*, and two socio-demographic variables *Household size* and *Age* (**H7**). Table 5 shows that the O2O In-store consumption variables for married participants and participants with a partner have similar mean values that are higher than that for single participants.

Figure 1 indicates that Chinese dish (non-simple meal) dominates the O2O Delivery food consumption, with more that 51% of participants indicating their O2O In-store consumption of it within the past year, followed by hot pot with over 30% of participants reporting its consumption. Over 20% of participants noted their O2O In-store consumption with Western dish (non-fast food), Buffet and Chinese simple meal and over 10% of them reported consumption of Western fast food, Chinese traditional food and Barbecue.

Food choice with the New Retail mode

New Retail attitudes have significantly positive relationships with three FCMs *Taste appeal*, *Quality concern* and *Others' reviews* and two socio-demographic variables *Gender (female)* and *Household size,* and the New Retail attitudes (**H4**).

New Retail consumption has a significantly positive relationship with New Retail attitudes and significantly negative relationships with two socio-demographic variables *Age* and *Occupation3* (**H8**). Table 5 shows that the New Retail consumption variable for students has a lower mean value than that for participants with other occupations.

Figure 1 shows that live aquatic products and fresh fruits dominate New Retail food consumption, with over 40% of participants indicating those categories for in the past year. Approximately 20% of participants indicate the consumption of dairy products, fresh meat and frozen aquatic products in the New Retail mode, and over 10% of them report that for snack, fresh vegetable, cooked aquatic product and imported foods.

Discussion

In regards to the preferred e-commerce food categories, the findings indicate that snacks dominate B2C food consumption, followed by nut and dairy products. This is in line with previous findings that consumers mainly purchase packaged and bulky foods through B2C platforms (Chintagunta et al., 2012; Jin et al., 2016; Kang et al., 2016; Ramus and Nielsen, 2005; Wang and Somogyi, 2018). Meanwhile this is the first study to show the preferred food categories of consumers within the e-commerce modes of O2O Delivery (simple meals such as Chinese simple meals and Western fast food), O2O In-store (non-simple meals such as Chinese and Western dishes) and New Retail (fresh food such as live aquatic products and fresh fruits). In general, consumers have different preferences of food categories in the four e-commerce modes.

Consumer food e-commerce attitudes showed a strongly positive relationship with their food e-commerce consumption in all the four e-commerce models. This is in line with previous findings that consumer attitudes have significantly positive effects on their food consumption in both offline and online environments (Cho et al., 2018; Hansen, 2008; Pieniak et al., 2009; Wang and Somogyi, 2018). This indicates that the FCMs and socio-demographic characteristics with direct effects on food e-commerce attitudes, have indirect effects on food e-commerce consumption (Pieniak et al., 2009; Wang and Somogyi, 2018). It should be mentioned that most of FCMs only have this indirect influence to the e-commerce food consumption including, *Value for money, Safety concern, Quality concern, Purchase convenience* and *Others' reviews.*

It is the first study to determine that consumers are not satisfied by *Value for Money* in food products purchased from B2C platforms. This may be because B2C platforms encourage more impulse buying due to its highly convenient shopping mode and the frequent promotions/discounts (Childers et al., 2001; Dawson and Kim, 2009). As such, consumers frequently purchase non-essential and subsequently wasted food products, and thus consider them *low value for money* (Childers et al., 2001; Dawson and Kim, 2009). That might also be a reflection of the reality that many Chinese consumers are not satisfied with their shopping experience on B2C platforms because there is a greater likelihood that they will receive products of low quality, fake brands, and with differences from the online images (Liu, He, Gao, and Xie, 2008; Jun and Jaafar, 2011). While this significant relationship has not been found for other three e-commerce modes. This may be caused by their specific food consumption patterns (half online and half offline) and the consumption preferences for food categories (cooked meals and fresh food, see Figure 1). This differs from that for the B2C mode (completing the whole purchase online with the consumption preferences for packed foods). Consumers may have less opportunity to impulse buy non-packed food products in the half-

online and half-offline environment when food shopping in the O2O and New Retail platforms compared to B2C mode (Childers et al., 2001; Chintagunta et al., 2012; Degeratu et al., 2000).

Safety concerns have a positive effect on consumer food e-commerce attitudes in the B2C mode but no significant effect in the O2O and New Retail modes. This may be caused by the different category preferences for food consumption between B2C and the other e-commerce modes. Consumers prefer to purchase packaged foods through B2C platforms because they can more easily obtain, compare and trace product information (e.g. expiry dates, ingredients and origin) to evaluate safety issues than when purchasing in offline stores (Chintagunta et al., 2012; Jin et al., 2016; Kang et al., 2016; Ramus and Nielsen, 2005). Evaluating safety issues for fresh food and cooked meals by physically checking (e.g. degree of freshness) is almost impossible using the information received from the O2O or New Retail platforms (Chintagunta et al., 2012; Kang et al., 2016; Ramus and Nielsen, 2005).

Quality concern has a positive effect on consumer food e-commerce attitudes with B2C. This is in line with previous findings that high quality is an important reason for consumers to purchase packaged foods through B2C platforms due to the higher quality items available in online shops than their local offline stores (Chintagunta et al., 2012; Jin et al., 2017; Kang et al., 2016; Morganosky and Cude, 2012). The findings of this study indicate that consumer quality concerns have a positive effect on their food e-commerce attitudes with O2O Delivery and New Retail modes. In other words, they have positive impressions of the quality of cooked meals and fresh food sold by O2O Delivery and New Retail platforms. This compensates for the deficiency of B2C platforms in e-commerce food consumption, in which consumers have low quality impressions on fresh and perishable foods (Chintagunta et al., 2012; Jin et al., 2017; Kang et al., 2016; Morganosky and Cude, 2012). *Quality concern* has no significant effect on consumer food e-commerce attitudes or consumption via O2O In-store mode. This may be caused by the specific food consumption patterns of the O2O In-store mode, where consumers mainly purchase non-simple meals physically at restaurants, ordered or paid for through O2O In-store platforms, rather than the B2C, O2O Delivery or New Retail modes, thereby physically eating or cooking in their own homes with packaged foods, simple meals or fresh foods. Wang and Somogyi (2018) indicated that consumers do not focus on quality issues when eating fancy meals in restaurants, as restaurant owners take the major responsibility for quality-assurance of those meals.

According to convenience-related FCMs, *Processed-convenience* has a positive effect on food consumption via O2O Delivery platforms. *Purchase-convenience* has a positive effect on consumer food e-commerce attitudes with B2C and O2O Delivery platforms. This confirms the findings by previous studies that perceived convenience (e.g. timing saving for purchasing or cooking) is the most important factor driving consumer food consumption with B2C and O2O Delivery platforms (Chintagunta et al., 2012; Cho et al., 2018; Chu et al., 2010; Kang et al., 2016; Morganosky and Cude, 2012; Mortimer et al., 2016; Ramus and Nielsen, 2005; Wu et al., 2015), while such significant effects do not exist for the O2O In-store and New Retail modes. This may be because food consumption patterns in O2O In-store and New Retail modes are similar to those of traditional offline restaurants and stores, where food is physically collected or eaten offline, compared to B2C and O2O Delivery platforms, which involve rapidly completing purchasing online without needing to go to offline restaurants and stores. Consumers thus attach less importance to the convenience of food consumption with O2O In-store and New Retail platforms.

Others' Reviews have a positive effect on consumer food e-commerce attitudes in B2C, O2O In-store and New Retail modes. This corresponds with previous findings that perceived social norms, such as others' opinions, ratings and reviews, as a significant factor driving the adoption of food consumption on e-commerce platforms (Cho et al., 2018; Hansen, 2005; Hansen, 2008; Heng et al., 2018; Xiao et al., 2017). Our study is the first to find that *Others'*

Reviews do not directly have significant effects on food consumption with B2C, O2O In-store and New Retail modes, but have indirect effects through consumer e-commerce food shopping attitudes. No significant effect was found with the O2O Delivery mode. This may be caused by the specific food consumption pattern of the O2O Delivery platform. Consumers, particularly in big cities, mainly order simple meals from O2O Delivery platforms in order to deal with the time pressure in their daily lives and subsequently save time purchasing and cooking (Cho et al., 2018; Heng et al., 2018; iResearch, 2018; Pieniak et al., 2009; Xiao et al., 2017). As such, they attach less importance to the reviews of others regarding the O2O Delivery mode compared to other e-commerce modes.

Taste Appeal refers to consumer's psychological motivation seeking for appetizing reassurance or taste pleasure for food choices (Steptoe et al., 1995; Wang et al., 2015). It has a significant effect on consumer food e-commerce attitudes and/or consumption within O2O Delivery, O2O In-store and New Retail modes, but has no significant effects within the B2C mode. This is partly in line with previous findings that consumer taste concerns have a more important effect on their e-commerce purchase of fresh food, which is the preferred food category for the New Retail mode, than that of bulky food, which is the preferred food category for the B2C mode (Kang et al., 2016). Although it has a positive effect on consumer e-commerce attitudes in the O2O In-store platform, *Taste Appeal* has a negative effect on e-commerce consumption within O2O Delivery and In-store platforms. This suggests that consumer generally have negative experiences with meals purchased from restaurants on O2O platforms.

Age has a negative effect on e-commerce food consumption or attitudes, in all four e-commerce modes. This is in line with previous findings that older people are less willing than younger people to accept e-commerce food consumption due to their lower adaptive ability to new technologies (Hansen, 2005; Morganosky and Cude, 2012). Some studies offer detailed findings that people aged between 30 to 45 have more positive attitudes or purchase intentions with B2C food consumption than other age groups (Kaur and Shukla, 2016; Wang and Somogyi, 2018). This cannot be confirmed by our findings, based on regression analysis.

Marital status has a significant effect on consumer food e-commerce consumption or attitudes, in the B2C and O2O modes (see Table 4 and 5). Married people have slightly higher consumption frequencies and more positive attitudes towards food consumption via the B2C platforms than single people and people with a partner. This may be because married people are more likely to have regular and formalised dietary patterns than single people and non-married couples, as they are frequently food shopping and cooking for family meals, (Kremmer et al., 1998). These findings correspond with previous findings that married people are more likely to become frequent B2C online food buyers than people with other marital statuses (Wang and Somogyi, 2018). Married people and people with a partner also have more frequent consumption patterns and/or more positive attitudes towards meal consumption with O2O Delivery and In-store platforms than do single people. This may be because that married people and people with a partner are inclined to eat together more often and therefore have a higher probability of ordering a meal from restaurants using O2O platforms than single people (Kremmer et al., 1998). While such significant relationships are not found for the New Retail mode.

Female consumers have higher consumption frequencies for food using the B2C mode and more positive attitudes towards food e-commerce in the New Retail mode than male consumers, while male consumers have more positive food e-commerce attitudes towards O2O Delivery platforms than female consumers. This may be due to different levels of involvement in food cooking and preparation. Women often take more responsibility for a household's meal cooking and grocery shopping (Hansen 2005, Kremmer et al., 1998). As such, it is reasonable to state that female consumers are more likely to purchase cooking ingredients (e.g. fresh and

packaged foods) from B2C and New Retail platforms than male consumers, and male consumers are more willing to purchase meals from O2O Delivery modes than their female counterparts.

Household size is positively linked to consumer food e-commerce attitudes towards New Retail mode and negatively associated with their food e-commerce consumption via O2O In-store mode. This may be caused by the different dietary consumption patterns between small and large families. Large families have a greater need to increase nutritional intake for children and older family members and are therefore more willing to purchase fresh foods from New Retail stores than small families (Wang and Somogyi, 2018). Larger families consume fewer (non-simple) meals via O2O In-store platforms because they have greater desire to cut food costs than small families (Cullen, 1994).

Income has a positive effect on consumer food e-commerce consumption with B2C. This corresponds with previous findings that people with a higher income levels are more willing to purchase food through B2C platforms than those with a lower level of income (Cho et al., 2018; Wang and Somogyi, 2018). This study is also the first to find that personal income has no significant effect on consumer food consumption in the O2O and New Retail modes.

Occupation has a significant effect on consumer food e-commerce attitudes within O2O Delivery and In-store modes and their food consumption with the New Retail mode. Students have slightly less positive food e-commerce attitudes regarding the O2O modes and a slightly lower level of food consumption with the New Retail mode than those with other occupations (see Table 5). This may be caused by the specific food consumption patterns by students in China. University students mainly eat at school-run canteens and are not allowed to cook by themselves in China (Zoninsein, 2013). As such, they may have a lower frequency to order meals from restaurants (e.g. by O2O platforms or at New Retail stores) and purchase the fresh cooking ingredients from local stores (e.g. at New Retail stores).

City has a significant effect on consumer food e-commerce attitudes with B2C mode. Beijing and Shanghai consumers have more positive food e-commerce attitudes regarding B2C platforms than Shenzhen consumers (see Table 5). This may be caused by different development levels among these three cities. Beijing and Shanghai are China's political and economic capitals, and international metropolis, and they are more developed in economics, educational sections, new technological applications and social interaction, which may result in a more developed food e-commerce market (e.g. with more food choices and faster delivery) than that in other cities (Pieniak et al., 2009; Wang and Somogyi, 2018). As such, Beijing and Shanghai consumers have more B2C food consumption experiences, which result in more positive B2C food attitudes than consumers in other cities, such as Shenzhen. Such significant effects do not exist for the O2O Delivery, O2O In-store and New Retail modes. This may be due to the similar food service patterns of O2O and New Retail platforms among the three cities, with limited choices for local food sellers and similar delivery distances (within around three kilometres); which are different from the B2C mode which has many food choices from around the world and almost unlimited delivery distances (iResearch, 2018; Mitchell, 2018; Peterson, 2018). It is therefore reasonable to state that consumers in different cities have similar perceptions or attitudes toward food consumption with the O2O and New Retail modes.

Conclusions, implications and limitations

This study has numerous academic contributions. Based on the findings from both the qualitative and quantitative data, it is the first to recognize the FCMs related to e-commerce shopping such as: Taste Appeal, Value for Money, Cheap, Variety, Safety Concerns, Quality Concerns, Processed Convenience, Purchase Convenience, Others' Reviews and Discount. This is a contribution to the theory of FCMs proposed by Steptoe et al. (1995) and provides a suitable measurement tool for researchers to develop their surveys for testing consumers'

choice motives for e-commerce food shopping. Further, previous consumer-based studies only focus on food shopping with a single e-commerce mode (e.g. B2C or O2O). This study is the first to compare consumers' choice motives, socio-demographics, attitudes, consumption and categorial preferences for food shopping between different e-commerce modes. As such, these findings will help researchers to better understand consumers' e-commerce food shopping behaviour and assist them in designing studies in the future.

Our findings also have significant managerial and policy implications. Food producers, marketers and policy-makers now have a better understanding of e-commerce food consumer behaviours especially for the different e-commerce modes which should allow them to streamline their product offering focussing on those preferred by consumers. This research can also assist them to develop effective marketing strategies and promotion policies for their e-commerce food products. Efforts could be made to improve the food product attributes related to the important FCMs for consumer choices of food products in different e-commerce modes. For example, they could improve consumers' taste impressions of food products for O2O Delivery, O2O In-store and New Retail platforms, either through advertisements claiming "better flavour" or working with the owners of these platforms to produce and promote tastier food. They should improve consumer impressions of 'good value for money' for their food products only for B2C platforms. Our findings can also help food producers and policy-makers to target the right consumers for their products. For example, they should focus on female consumers when selling and promoting food products through B2C platforms and direct their efforts to male consumers for O2O Delivery platforms. Thirdly, our findings can help food producers, marketers and policy-makers to sell and promote the right food products within the different e-commerce modes. For instance, they should sell and promote packaged food products through B2C platforms and fresh food products through New Retail platforms and stores.

Some limitations of this study should also be noted. Firstly, only participants who had consumed food in all the B2C, O2O Delivery and O2O In-store platforms in the past were retained as valid participants in our study. This may result in a sampling bias, as consumers who had food shopping experience with one, two or none of these three e-commerce modes were excluded from our study. The questionnaire was sent to a total of 1117 members of the consumer sample panel from the three most developed cities in China: Beijing, Shanghai and Shenzhen, 954 of which were valid and involved in our study. As such, 85% of the 1117 participants had food shopping experience with all the three-commerce mode. This percentage would be higher if considering those invalid participants who were excluded from the survey due to careless answers. This is in line with the high penetration and development levels of B2C and O2O e-commerce food shopping in China, particularly in large Chinese cities.

Secondly, we used a single-item approach to measure participant attitudes and consumption regarding food shopping in each of the four e-commerce modes. These measurement approaches had been confirmed by previous studies to explore consumer attitudes and consumption towards different food products with high reliability (Pieniak et al., 2009; Wang et al., 2015; Wang and Somogyi, 2018). It is a common practice to measure behaviour using a single item (Pieniak et al., 2009). A multiple-item design with bipolar adjectives (e.g. unhappy/happy, dull/exciting, and terrible/delightful) has often been employed to measure consumer attitudes in previous studies (Pieniak et al., 2009; Wang et al., 2015; Wang and Somogyi, 2018). We used a single-item design in our study due to the high reliability of its multiple-item measurement of consumer attitudes towards food or e-commerce food shopping shown in previous studies, with Cronbach's α scores often above 0.85 (Krystallis et al., 2012; Wang et al., 2015; Wang and Somogyi, 2018). The single item approach also helped us to shorten the questionnaire and thus reduce the survey cost. It is recommended that future studies follow the multiple measurement approach to consumer attitudes.

Thirdly, our sampling focused on consumers aged over 18, who had e-commerce food consumption experiences, and lived in the most developed Chinese cities. As such, the sample did not fully represent the socio-demographic characteristics of China, or of the three cities.

Fourthly, given the scope of this study, it only explored FMCs and Socio-demographics that influence consumers' attitudes and consumptions towards food shopping with the four e-commerce modes. It is recommended that future studies explore the influences of other possible important factors such as website quality and social media (Galati et al., 2016; 2017; 2019).

Fifthly, the study provided knowledge regarding socio-demographics, FCMs and food categories of food e-commerce shopping with the four modes by using linear regression and descriptive analysis. It is recommended that researchers use other statistical tools in their future studies in order to present more information about consumers' e-commerce food shopping behaviours.

Finally, this study compared our findings with that from previous studies. However, as this study was exploratory in nature and focusing on a new academic and industry context, we could not find literature to compare or explain part of our findings. It is therefore recommended that researchers conduct further studies to better compare and contrast the findings of this study.

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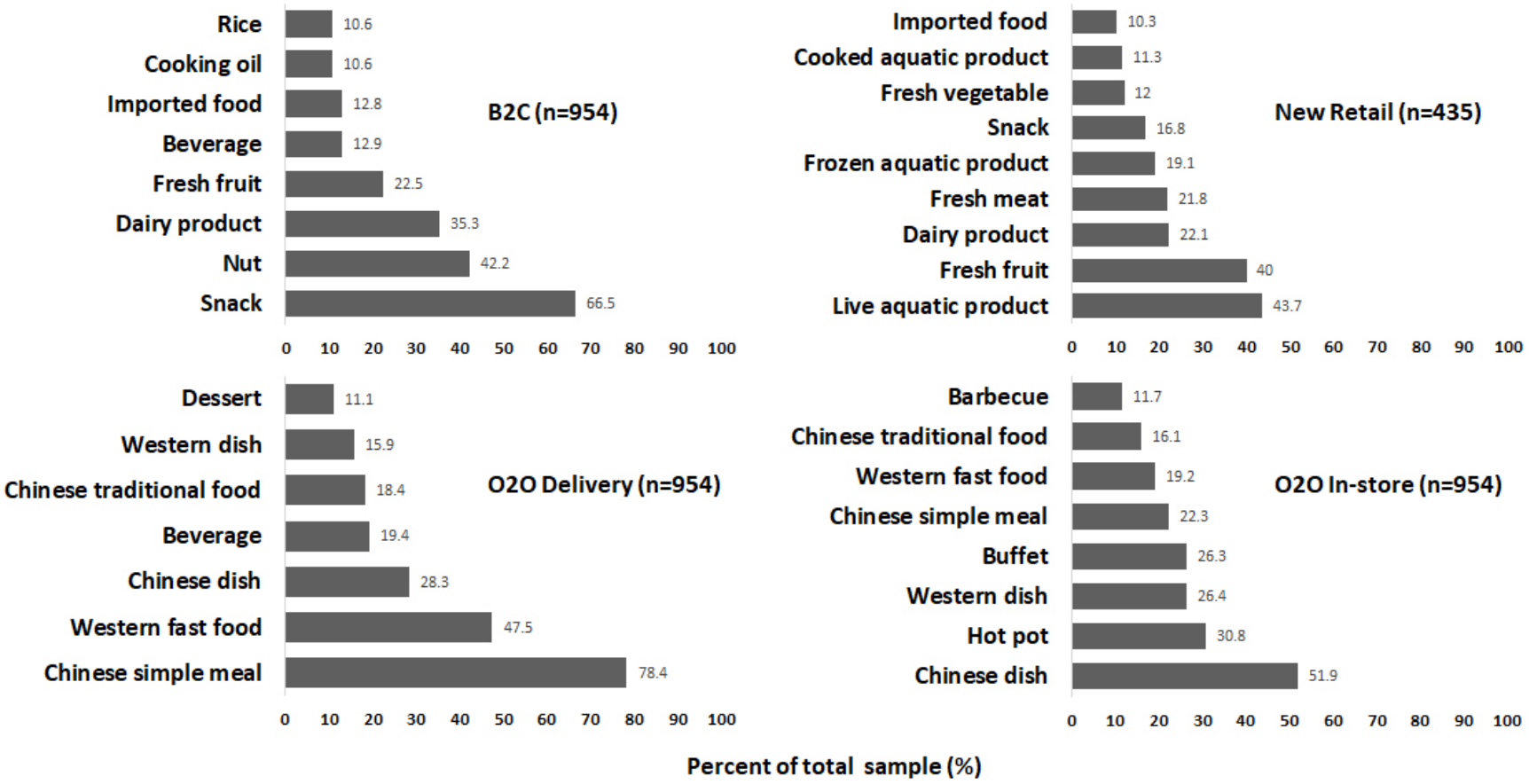

Figure 1 Food categories indicated by 10 percent or more of total participants in their consumption through different e-commerce platforms

Note: *Please see Table 1 for definitions of food categories.*

Table 1 Measurement items of food category consumption through different e-commerce platforms

E-commerce platform	Measurement item (food category and its definition)
B2C	1. Snack, 2. Nut, 3. Dairy product, 4. Cooked meat, 5. Dried meat, 6. Frozen meat, 7. Fresh meat, 8. Fresh fruit, 9. Dried fruit, 10. Cooked aquatic product, 11. Frozen aquatic product, 12. Dried aquatic product, 13. Live aquatic product, 14. Beverage, 15. Cooking oil, 16. Instant food, 17. Rice, 18. Flour, 19. Imported food, 20. Bread, 21. Cereal, 22. Other
O2O Delivery	1. Chinese simple meal (e.g. noodle, lunch box, pilaf…), 2. Western fast food (e.g. burgers, fries…), 3. Chinese traditional food (e.g. dumpling, bun…), 4. Chinese dish (except simple meal, hot pot, hot-hot-hot, traditional food, and barbecue), 5. Western dish (e.g. steak, salad…, except fast-food), 6. Beverage, 7. Dessert, 8. Fruit, 9. Hot pot, 10. Barbecue, 11. Hot-hot-hot, 12. Other
O2O In-store	1. Hot pot, 2. Hot-hot-hot, 3. Chinese dish (except simple meal, hot pot, hot-hot-hot, traditional food, barbecue, combo and buffet), 4. Chinese traditional food (dumpling, bun…), 5. Western-dish (e.g. steak, salad…, except fast-food), 6. Dessert, 7. Barbecue, 8. Buffet, 9. Western fast food (e.g. burgers, fries…), 10. Chinese simple meal (e.g. noodle, lunch box, pilaf…), 11. Beverage, 12. Japanese meal, 13. Combo, 14. Other
New Retail	1. Snack, 2. Nut, 3. Dairy product, 4. Cooked meat, 5. Dried meat, 6. Frozen meat, 7. Fresh meat, 8. Fresh fruit, 9. Dried fruit, 10. Cooked aquatic product, 11. Frozen aquatic product, 12. Dried aquatic product, 13. Live aquatic product, 14. Beverage, 15. Cooking oil, 16. Instant food, 17. Rice, 18. Flour, 19. Imported food, 20. Bread, 21. Cereal, 22. Fresh vegetable, 23. Other

Table 2 Socio-demographic distribution of the sample

		Total sample	Beijing	Shanghai	Shenzhen
Sample size (n=)		954	319	326	309
Gender					
	Male	49.4%	50.2%	47.5%	50.5%
	Female	50.6%	49.8%	52.5%	49.5%
Marital status					
	Married	69.7%	71.5%	78.8%	58.3%
	No, but has a partner	12.6%	11.3%	8.0%	18.8%
	Single	17.7%	17.2%	13.2%	23.0%
Age					
	Range	18-69	19-69	18-65	18-60
	Mean (Std. Deviation)	33.8 (9.113)	35.1(9.935)	35.1 (8.091)	31.0 (8.621)
	18-25	19.9%	16.9%	11.7%	31.7%
	26-40	51.3%	48.6%	58.2%	46.6%
	≥41	28.8%	34.5%	30.1%	21.7%
Personal income (RMB, monthly)	0-5000	18.4%	20.4%	11.7%	23.6%
	5001-10000	52.9%	51.4%	55.8%	51.5%
	≥10001	28.6%	28.2%	32.5%	24.9%
Education					
	High school, polytechnic school or below	7.0%	5.3%	6.4%	9.4%
	College degree	16.5%	14.1%	11.3%	24.3%
	Bachelor degree	63.9%	63.9%	69.0%	58.6%
	Master degree or above	12.6%	16.6%	13.2%	7.8%
Occupation					
	Managing employee	41.1%	39.2%	42.6%	41.4%
	Salaried employee	42.6%	42.0%	43.3%	42.4%
	Student	7.5%	8.2%	5.2%	9.4%
	Other (worker, retired, self-employed, on-leave, housewife/houseman, unemployed, others)	8.8%	10.7%	8.9%	6.8%
Household size					
	1-2	9.1%	12.9%	9.2%	5.2%
	3	52.7%	57.7%	67.8%	31.7%
	4	19.6%	18.2%	11.0%	30.1%
	≥5	18.6%	11.3%	12.0%	33.0%
With food consumption experience by e-commerce platforms					
	B2C	100%	100%	100%	100%
	O2O Delivery	100%	100%	100%	100%
	O2O In-store	100%	100%	100%	100%
	New Retail	45.6%	42.6%	62.3%	31.0%

Table 3 Measurement items and correlation matrix of FCM variables

Food choice motive	Measurement item
Taste appeal	Is delicious.
Value for money	Has a good value for money.
Cheap	Is cheap.
Variety	Has a wide variety to choose.
Safety concern	Is reliable in safety.
Quality concern	Has a high quality.
Processed convenience	Takes no time to prepare or cook.
Purchase convenience	Is easy to purchase.
Others' reviews	Is sold by sellers who get good evaluations from other buyers.
Discount	Has a discount.

Correlation matrix of FCM variables

Factor	1	2	3	4	5	6	7	8	9	10
1. Taste appeal	1									
2. Value for money	0.495	1								
3. Cheap	0.246	0.443	1							
4. Variety	0.437	0.383	0.279	1						
5. Safety concern	0.582	0.504	0.241	0.398	1					
6. Quality concern	0.545	0.432	0.176	0.432	0.615	1				
7. Processed convenience	0.183	0.224	0.333	0.296	0.150	0.147	1			
8. Purchase convenience	0.277	0.295	0.285	0.393	0.228	0.272	0.285	1		
9. Others' reviews	0.365	0.285	0.226	0.379	0.317	0.333	0.299	0.374	1	
10. Discount	0.265	0.366	0.456	0.378	0.257	0.272	0.309	0.399	0.309	1

Note: *All correlations are significant at 0.01 level.*

Table 4 Determinants of food consumption and attitude toward food consumption with e-commerce modes (outcomes of linear regression)

Independent variable	Dependent variable							
	Attitude				**Consumption**			
	B2C	O2O Delivery	O2O In-store	New Retail	B2C	O2O Delivery	O2O In-store	New Retail
	H1	H2	H3	H4	H5	H6	H7	H8
	Coefficient estimates							
City1	0.175*	0.101	0.135	0.031	-0.012	0.024	-0.006	0.259
City2	0.135	0.046	0.107	0.054	0.079	-0.096	0.022	0.001
Gender (female)	0.046	-0.133*	-0.015	0.191*	0.140*	0.071	-0.0002	0.095
Household size	0.020	0.007	-0.031	0.140*	-0.043	-0.057	-0.087*	0.045
Age	-0.009*	-0.018***	-0.007	0.002	-0.014**	-0.031***	-0.028***	-0.022**
Income	-0.045	-0.054	-0.039	-0.032	0.191**	0.128	0.087	0.197
Occupation1	0.196	0.122	0.222	0.359	0.175	0.095	0.007	-0.298
Occupation2	0.148	0.031	0.242*	0.215	0.111	-0.052	-0.161	-0.262
Occupation3	-0.189	-0.446*	-0.187	0.419	0.225	-0.237	-0.339	-1.022*
Education	0.061	0.014	0.066	0.090	0.045	0.022	-0.012	-0.010
Marital status1	0.086	0.325**	-0.024	0.326	0.351**	0.330**	0.473***	0.364
Martial status2	0.024	0.186	0.047	0.073	0.138	0.230	0.314*	0.209
Taste appeal	0.043	0.053	0.095*	0.132*	-0.009	-0.126**	-0.119**	-0.122
Value for money	-0.061*	-0.015	0.005	-0.053	0.012	0.020	0.058	0.079
Cheap	0.0002	-0.008	-0.004	0.018	0.003	0.007	0.034	0.043
Variety	-0.018	0.041	0.037	0.060	0.074	-0.002	-0.054	-0.103
Safety concern	0.071*	0.031	0.060	-0.012	-0.040	0.059	0.003	0.083
Quality concern	0.113***	0.105**	0.062	0.165**	0.035	0.019	0.062	-0.002
Processed convenience	-0.001	0.031	0.006	-0.022	0.035	0.054*	-0.002	0.030
Purchase convenience	0.095**	0.094**	0.039	0.012	0.0004	-0.001	0.018	0.092
Others' reviews	0.084**	0.026	0.076*	0.108*	-0.044	0.005	-0.001	0.017
Discount	0.056	0.020	0.031	0.048	0.005	0.003	0.050	-0.060
Attitude					0.506***	0.531***	0.432***	0.582***
R^2 adjusted	0.1399	0.1251	0.1258	0.1707	0.2374	0.2623	0.1959	0.2325
N=	954	954	954	435	954	954	954	435

Note: **** p<0.001; ** p<0.01; * p<0.05.*

Table 5 Differences of the food e-commerce consumptions and attitudes among the categorical socio-demographic groups with significant relationships to the dependent variables in the linear regression analyses (Table 4): Mean (SD)

Attitude/consumption	Socio-demographic groups (mean)				*F*	*p*
	City					
	Beijing	Shanghai	Shenzhen			
Attitude towards B2C (n=954)	5.69[a] (0.945)	5.67[a] (0.951)	5.44[b] (1.079)		5.927	0.003
	Marital status					
	Married	With a partner	Single			
Attitude towards O2O Delivery (n=954)	5.48[a] (1.035)	5.38[ab] (1.070)	5.16[b] (1.026)		6.258	0.002
Consumption by B2C (n=954)	4.86[a] (1.212)	4.63[ab] (1.174)	4.45[b] (1.149)		8.709	0.000
Consumption by O2O Delivery (n=954)	4.52[a] (1.287)	4.62[a] (1.204)	4.20[b] (1.312)		5.090	0.006
Consumption by O2O In-store (n=954)	4.58[a] (1.222)	4.62[a] (1.168)	4.24[b] (1.260)		5.723	0.003
	Occupation					
	Managing employee	Salaried employee	Student	Other		
Attitude towards O2O Delivery (n=954)	5.51[a] (1.046)	5.42[a] (0.995)	4.94[b] (1.086)[b]	5.24[ab] (1.115)	6.949	0.000
Attitude towards O2O In-store (n=954)	5.58[ab] (1.098)	5.63[b] (0.962)	5.26[a] (1.075)	5.26[a] (1.131)	4.796	0.003
Consumption by New Retail (n=435)	4.86[a] (1.321)	4.69[a] (1.278)	3.67[b] (1.500)	4.65[a] (1.142)	2.828	0.038

Note: *With statistics from one-way ANOVA tests (confidence interval= 95%); a - c indicate significantly different means.*