

# Effect of online food delivery service use on dietary choices among older adults

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**Abstract.** The purpose of this paper is to explore the relationship of the use of online food delivery (OFD) services and the wait time when using OFD services with the diet of older adults. This study also investigated the moderating effect of OFD services on the relationship between willingness to wait and the making of food choices. This paper contains two experimental studies. 123 and 171 older adults participated in the two studies respectively. All participants were recruited and randomly assigned to each experimental groups. According to the results of two studies, older adults were willing to spend more time waiting for food from OFD services than when dining in or taking out from a restaurant. Furthermore, OFD use moderated the relationship between food choice (lower vs. higher calories) and wait time. Older adults were willing to wait longer for lower calories food when choosing OFD services. Furthermore, regardless of the time taken for food delivery, older adults chose lower calories' food when using OFD services. This study observed that OFD changed how older adults chose to buy food.

## 1 Introduction

Countries worldwide are grappling with the challenges of an aging society. Among these challenges is helping older adults maintain a proper, nutrient-dense diet [1]. The diet of older adults influences their physical health [2, 3], and Host et al. [4] reported that older adults may limit their dietary choices due to declining physical function. For instance, aging may lead to the deterioration of physiological functions [5, 6]. Consider a scenario where an individual either must travel to a store for lunch or cook a meal. A healthy older adult can freely choose between both options but an older adult with weak limbs, which prevents them from carrying or lifting heavy objects for a long time [7], may find it difficult to buy groceries for the month or even week. Furthermore, some older adult resides alone [8]. They may find cooking every day to be an onerous chore. Alternatively, some individuals are unconcerned about what they eat or about having three square meals a day. The aforementioned problems can be remedied by online food delivery (OFD) services. Based on the COVID-19 period, the government may prohibit people from going out frequently [9, 10]. Such services have become a popular research topic worldwide due to COVID-19-related lockdown measures. In general, the death rate of older adults has

increased during the pandemic [11], and studies have reported that people's dietary habits have changed during the COVID-19 pandemic [12]. Sheu et al. [13] reported that consumers are reluctant to spend time queuing, and Chen and Jia [14] reported that a long and unpleasant wait may cause consumers to leave the queue. Furthermore, some consumers may prefer higher calories food (e.g., fast food) not so much because of their taste but because the wait time is shorter [15]. Interestingly, studies have revealed that consumers are willing to wait longer if the food offers them additional benefits [16, 17], such as promotion or it being healthy.

OFD services are not new, but their popularity has skyrocketed worldwide with the increasing sophistication of mobile applications [18] and have become increasingly essential [19]. However, studies on new technologies have neglected older adults, focusing on consumers, workers, or young people instead [20 -22]. Hutto et al. [23] argued that older adults should regard technology as a means to augment rather than replace everyday life. This study extends the literature on consumer behavior when buying food (an essential) to the context of OFD and older adults. OFD differs from the traditional catering industry in that OFD frees the consumer from buying food in person [24], which can be physically onerous or prohibitively inconvenient for older adults. Sheu et

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al. [13] found that consumers are reluctant to spend a long-time queuing. And consumers perceive wait times to be shorter when they are doing something else as a distraction [25, 26]. Webber et al. [27] mentioned that older adults may be less willing to go out because their mobility is impeded by their advanced age.

Furthermore, people increasingly believe that their health is directly affected by their food [28 -30]. The diet of older adults (and people in general) affects their physical health [2, 3] with respect to the risks of illness and death [31, 32]. Furthermore, older adults tend to make healthier food choices relative to younger adults [33, 34].

In summary, older adults often face problems in their dietary choices. For example, older adult men residing alone may have insufficient nutrient intake [35] In the past, governments implemented policies where meal delivery services are provided for older adults. Zhu and An [36] argued that family meal delivery plans enhanced the quality of older adults' diets and improved their nutritional intake. Similarly, OFD services, due to their convenience, may influence older adults to make healthy meal choices through changes in their consumption habits toward options.

Considering the aforementioned context, this study explored the relationship of the use of OFD services and the wait time when using OFD services with the diet of older adults. This study also investigated the moderating effect of OFD services on the relationship between willingness to wait and the making of food choices. Specifically, this study hypothesizes that older adults are more willing to make lower calories food choices when using OFD services because it eliminates the physical demands of dining in or taking out. Therefore, the current study employs two sub-studies to explore this issue.

## 2 Study 1

### 2.1 Participants

In Study 1, 123 participants (32.5% male; age: 55 - 81; mean age = 64.37, standard deviation for age = 6.62) were recruited and randomly assigned to one of four conditions **2(A. buying in person vs. B. using an OFD service) × 2(1. lower vs. 2. higher calories)**. In short, the participants were divided into four groups: A1, A2, B1, and B2.

### 2.2 Procedure and measures

Study 1 featured two narrative scenarios, in which older adult participants were required to imagine that

they were buying food. The results were used to investigate the difference in their willingness to wait between the two scenarios. The two scenarios provided were described as follows: "Imagine you are buying food in person" and "Imagine you are buying food through a delivery service."

Then, participants were required to provide the number of minutes they were willing to wait to buy the food in the picture in the questionnaire. Participants assigned to the lower calories food group saw an image of nutritiously balanced foods; participants assigned to the higher calories food group saw an image of a high-calorie fast food meal. Participants assigned to the group where they bought food in person were required to answer the following question: "Imagine you are buying food in person. How many minutes are you willing to wait for the food?" Participants assigned to the OFD service group were required to answer the following question: "Imagine you are buying food through a delivery service. How many minutes are you willing to wait for the food to arrive?" Finally, the participants were asked to write down their age and gender for the statistical analysis. In this study, the participants' responses (number of minutes) are presented in terms of their square root for statistical calculations.

### 2.3 Result

Table 1 presents the analysis of variance results. First, we noted an interaction effect of using an OFD service (vs. buying in person) and lower calories (vs. higher) food on willingness to wait ( $F(1, 119) = 5.13, p = .025$ ). As illustrated in Figure 1, when buying in person, the participants were willing to wait for lower calories y food ( $M = 3.16$ ) and higher calories food ( $M = 3.56$ ) for a similar length of time ( $F(1, 60) = 1.21, p = 0.276$ ). However, when using an OFD service, participants were willing to wait for lower calories food ( $M = 5.10$ ) longer than they would for higher calories food ( $M = 4.22; F(1, 59) = 4.10, p = .047$ ).

**Table 1.** ANOVA results of Study 1.

	older adults willing to wait N, M (SD)	
	lower calories food	higher calories food
buy in person	30, 3.16 (1.31)	32, 3.56 (1.50)
use OFD service	30, 5.10 (1.46)	31, 4.22 (1.89)
ANOVA (F)	5.13*	

\* $p < .05$

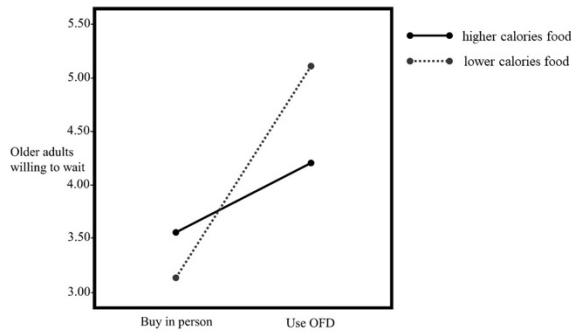


Fig. 1. Visualized results of Study 1.

### 3 Study 2

In Study 1, we observed that older adults were willing to wait longer for lower calories food when using an OFD service. In Study 2, we investigated whether the choice of lower versus higher calories food differed with respect to wait time.

#### 3.1 Participants

There were 171 participants (27.5% male; age: 52–79; mean age = 63.68, standard deviation for age = 5.87) recruited and randomly assigned to one of six scenarios defined by the pair (wait time for lower calories food – wait time for higher calories food [positive, negative, or 0], method of purchase [buying in person vs. using an OFD service]) in this study with a 3 × 2 between-subject design.

#### 3.2 Procedure and measures

In this study, participants received a questionnaire depicting two food choices, lower calories (depicted by a nutritiously balanced, normal-calorie meal) and higher calories (depicted by a high-calorie fast food meal). The participants were asked to choose which food they were more willing to buy. Each participant had one of three combinations of wait times: (10 and 30 minutes for lower and higher calories food, respectively; 10 and 30 minutes for higher and lower calories food, respectively; and 20 minutes for lower and higher calories food. Similar to Studies 1 and 2, the participants were asked to imagine themselves either buying in person or using an OFD service. Finally, the participants were asked to write down their age and gender.

### 3.3 Result

Chi-square tests were adopted to determine whether participants were more likely to choose lower calories (vs. higher) food under a given combination of wait times. We separately analyzed the scenarios of buying in person and using OFD services. We observed that when participants bought food in person, wait time did not significantly affect the choice between lower calories versus higher calories food ( $\chi^2(2, N= 81) = 2.013, p = .365$ ; Table 2). However, when using OFD services, participants were more likely to choose lower calories food regardless of the combination of wait times [ $\chi^2(2, N = 90) = 6.667, p = .036$ ].

Table 2. Chi-square results.

Waiting Time		Choice			
		Higher calories	Lower calories	Total	
Lower	<	n	10	20	30
	%	33.3%	66.7%	100%	
Higher	=	n	4	26	30
	%	13.3%	86.7%	100%	
Lower	>	n	13	17	30
	%	43.3%	56.7%	100%	

Note:  $\chi^2(2, N= 90) = 6.667, p = .036$

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### 4 Discussion

This study’s findings have several implications for scholars and practitioners. Research of OFDs has increased in recent years [37 - 39] and has skyrocketed during the COVID-19 pandemic [40 - 42]. This study focused on the effects of OFD services on older adults.

This study observed that OFD changed how older adults chose to buy food. Unlike when buying in person, the older adult participants were more willing to wait longer for a lower calories meal when using an OFD service. In fact, we found that the participants chose lower calories food regardless of its wait time relative to the wait time of higher calories food. In addition, participants were similarly likely to buy lower calories and higher calories food when buying in person. In general, this study reports that OFD use might benefits the calorie control in older adults.

### 5 Conclusion

Restaurants or food suppliers, especially those offering healthier options, using OFD services should market to older adults because they constitute a key demographic. The government should also promote

OFD services to older adults as this may have potential benefits in caloric control in older adults.

Although this study adopted controlled lab experiments to prevent confounding effects, effects from various confounders (e.g., brand, consumer reviews, and promotions) could have been overlooked. Future studies should control for various confounding factors. In addition, this study focused only on older adults. Future studies should focus on various ethnic groups or groups with special dietary needs, such as pregnant people or athletes, to explore the effects of OFD services on their everyday food consumption behavior.

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