THE RELATIONSHIPS BETWEEN CHOPSTICK LENGTH AND FOOD INTAKE

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Abstract - This study examines the influence of chopstick lengths on actual food consumption of dinners in a Chinese box restaurant. Diners are offered random chopsticks types in two length and their lunch boxes are weighted after they finish their meals to measure the actual consumption in real dining environment. The result indicates that people consume less food and have less mouthful while using longer chopstick compared to shorter ones, which suggest that using longer chopsticks can help control the amount of food intake without affecting satisfaction of dining experience. The finding of current study along with previous researches proved that bite size is the main mechanisms behind the relationship between utensil's physical characteristics and people's food consumption.

Keywords - Chopstick Length, Food Consumption, Utensils

I. INTRODUCTION

Keeping fit and maintaining a healthy diet has become a growing concern these days as many nutrition experts suggested that we should keep the number of calories we consume every day at an appropriate level. However, most people are losing track of how much food they consume due to distractions of digital devices like smartphone, computer, TV [1]-[2], social facilitation [3] and many environmental factors such as lighting, sound, and music [4] -[5] as well as illusions from tableware and utensil sizes [6] -[9]. Especially, tableware and utensils play an important role in our food consumption. To better understand the relationship between dining utensils and food intake, one stream of research has focused on the effect of tableware size on the quantity of food consumed [6]-[11]. Most of the studies have given evidences that people using larger utensils consume more than those who use smaller ones [8], [9], [11].

For example, Wansink [11] found that people who use larger spoon consume more food than those using smaller spoon. However, Mishra and his colleagues [7] found the use of smaller folk resulted in a larger quantity of food consumed than the bigger folk because people are willing to invest the effort in satisfying their goal to satiate their hunger. Apparently, different utensil has different size effect on food consumption. Therefore, a clear common model is needed to be developed for better overall understanding of how utensil size can affect the amount of food intake. Although chopsticks are among the major dining tools in Asia, researches on utensil size seem to pay little attention to this topic. Previous studies on chopsticks size and shape tend to focus on its serving performance and subjective evaluation for better using and provide guidance for mass-manufacturing [12]-[18]. Lin et al. [6] investigated the effect of chopstick length on food liking. They claimed that eating duration plays a crucial role in the quantity of food consumed. Long (vs. short) chopsticks caused people to slow down when eating, which leads to fewer mouthfuls; therefore, diners have a less overall quantity of food consumed. However, in that study, the actual consumption of a meal was not examined in order to provide evidence for their perceived conclusion. Accordingly, the current research conducts a field study to examine the influence of chopstick length (23 cm vs 19 cm) on actual food consumption of diners

We chose a Chinese box restaurant to collect data to observe some situational factors influencing diners' eating behaviour which cannot happen in a laboratory. Specifically, when visiting a restaurant to satiate their hunger, the customer pays money, time and effort to satisfy their well-defined goal with the possible best manner. Rather than a single consumption of food, a meal in a restaurant entails a continuous consumption behaviour that allows us to examine the influence of chopstick length on overall consumption. In addition, there is a certain amount of people in Asia eating out, and restaurants are the most common environment for their meals, except home eating.

II. FIELD STUDY

We conducted the field study in a popular Chinese box restaurant, located in Northern Taiwan near Minghsin University with more than 15 years of history. We got the restaurant owner's permission to conduct this study and observed the customers' behaviour in the restaurant. This restaurant offers typical menu, and the main meal box types are fired chicken meal, fired fish meal, grilled pork meal and grilled beef meal. Each meal box contains one main dish and three side dishes.

There are about 25 tables in the restaurant, serving lunch and dinner. Consumers can have meals in the restaurant or take away.

Two lengths (23 cm and 19 cm) of chopsticks were used for diners, both types of chopsticks are made of stainless steel, and the chopstick tips are grooved to improve gripping. The thickness of both types is the same to ensure both they can grip the same volume of food when using. Chopsticks with the material of stainless steel are the most common in Taiwan. These two chopstick lengths were both in the range of having optimal serving performance for food consumption [14], [17]. The study was conducted over eight days during lunches. Diners in different meal time of a day may have a different volume of food intake because of relaxation level or other factors. In order to minimize the variation of food consumption, we only observed diners during lunch time. One of the co-authors of the study and a research assistant served as waiter staff. In order to minimize the variety of meal weight that we observed, we selected grilled pork meal as our target; because grilled pork meal is the most popular meal in this restaurant. For each meal, two types of chopsticks were randomly offered to diners those who ordered grilled pork meal. The full boxes of food were weighed before serving to diners, and the average weight of each lunch box was 500g. The diners took the meal box ordered and a pair of chopsticks offered, went to a table and ate their meal. After diners finished their meal and left the restaurant, the research assistant took the food box that diners left from the table and weighed it, and the value was recorded. The date and gender were also noted.

III. RESULTS

We observed 75 diners (L=35; S=40) and examined the influence of chopstick length on the weight of food left on the box (less food left on the box indicated more consumption) while controlling for the gender (male vs. female). This ANCOVA showed that the use of the long chopsticks resulted in more food left on the box (i.e., less quantity consumed) than the short chopsticks (M_{long} = 404 g vs. M_{short} = 433 g; SDL=53.3 vs. SDS=45.2; $F(1,73) = 6.199$, $p<.05$, partial $\eta 2= .079$). The Levene's Test showed $p=0.329$.

Findings from the in-depth interviews

When we served in the restaurant, we also observed the diners' behaviour. It seemed that the quantity of meal consumed was in connection with mouthfuls and eating duration. In order to understand diners' thoughts and behaviour, we randomly interviewed 30 diners, 15 for using long chopsticks and 15 for using short chopsticks.

The authors interviewed with the diners, and asked: "Did you feel you finish the meal faster when using the chopsticks?" 10 out of the 15 diners who used long chopsticks said "I feel I spent quite a while to finish the meal" On the contrary, 12 out of the 15 diners who used short chopsticks stated, "I feel it is pretty quick to get satiated". In addition, the co-author asked, "Did you feel you take a lot of mouthfuls when eating the meal?" 11 out of the 15 diners who used long chopsticks said: "I feel I didn't take many mouthfuls while eating the meal". In contrast, 10 out of the 15 diners who used short chopsticks stated: "I feel I took a lot of mouthfuls while eating the meal". Furthermore, the co-author asked, "How long did you feel you spend on finishing the meal?" 9 out of the 15 diners using long chopsticks answered: "I spent about 20 minutes". While 12 out of the 15 diners using short chopsticks answered: "I spent about 15 minutes".

Evidence from the interviews further supported the fact that eating duration and mouthfuls were key attributes in the food consumption. Therefore, the qualitative data further supported the results from the diners who used the long (short) chopsticks spent more (less) time and took less (more) mouthfuls, resulting in the less (more) quantity of food consumption.

IV. DISCUSSION

We found that in a restaurant setting, diners consumed less food with long chopsticks (23cm) rather than with short chopsticks (19cm), which is in consistence with the outcome that long chopsticks can cause people to slow down and have longer eating duration in a meal [6].

The use of long chopsticks causes diners to have less mouthfuls and slower eating speed due to worse pinching performance that long chopsticks have [14], which actually helps reduce calories intake and prevent obesity [19] as long as increase satisfaction of diners [15].

Evidences from previous and current studies showed that bite site is the major mechanism behind the influence of utensils size on diners' food consumption [6], [7], [11]. The results of the previous studies on different types of utensils like fork, spoon and chopsticks seem to be mixed and inconsistent. However, if taking bite size as the mediator for explanation, we found that these results are in fact very consistent.

In the study of fork's bite size and quantity of food consumption, diners consume less when they use smaller forks rather than bigger fork in controlled condition of laboratory [7], which is aligned with previous research of spoon bite size and food consumption [11]. On the other hand, the result is reversed when they test in restaurant context and is concluded to be resulted from the well-defined goal since they invest effort and pay money for the meal, which states that the size of smaller fork give them the bias of not making enough progress that leads to the motivation of eating more. In term of our results on

chopstick length studies, it's obvious that the image of longer chopsticks doesn't give the bias of having less progress in finishing the meal longer chopsticks appear to have larger image than short chopsticks.

For practical application in overconsumption leading to obesity and other health problems, the research result suggests individuals to use longer chopsticks to control their quantity of food consumed. For instance, people who want to lose weight can choose longer chopsticks for everyday meals in order to reduce food intake more easily. Additionally, restaurants could get the better strategy in offering long chopsticks for serving not only to enhance customer satisfaction with the same amount of food provided but also to increase their enjoyment of meal.

Utensils play an important role in human's every day food intake which have great influence on our health and well-being; therefore, further understanding of the relationship between utensils physical characteristics and people's food consumption is essential in contribution to better utensils usage and production. Future researches can expand the topic by studying the influence of utensil's handle shapes and diameters, utensil's materials (wooden, bamboo, plastic, and metal), and so forth on diner's consumption. Cross-sectional studies on the interaction of physical characteristics between utensils and tableware like bowls and plates in term of food consumption is also worth considering.

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