

Informing the Cultural Translation of a Weight loss Intervention for
Overweight/Obese Adults in Beijing

by

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Thesis submitted in partial fulfillment of
the requirements for the degree of Master of Science in
Duke Global Health Institute in the Graduate School
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ABSTRACT

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Abstract

Objectives: To inform the cultural translation of a US behavioral intervention (iOTA) for the Chinese population.

Methods: We conducted a systematic literature review, counseling Chinese collaborators' experiences, and conducted key informant interviews. Thirty-eight overweight/obese participants ($BMI \geq 24$) were recruited from Peking University Health Science Center and Peking University Third Hospital for the key informant interviews. Only 20 (52.6%) participants (12 female, 8 male) who came to the face-to-face interview and completed the 20-minute survey were selected for data analysis. The interview contained questions about weight loss history, weight-related concerns and barriers during weight loss process, general lifestyles, and also inquiries of comments and acceptance for each iOTA goal and intervention approach.

Results: Physical activity and dieting are the primary options for weight loss. Health and lack of perseverance are the biggest weight loss concerns and barriers. After tailoring by literature review, all of the tailored iOTA goal and intervention approaches had more than 80% acceptance, except "Red meat no more than 1 time per week" with only 60% acceptance. 20% of people anticipated difficulty attending all of the 4 group sessions.

Conclusion: iOTA principle is largely accepted by the Chinese population with proper cultural modification focusing on health concerns, perseverance, special eating habit, and social stress.

Keywords: Weight-loss, interventions, iOTA, cultural translation, key informant interview

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1. Background

1.1 Obesity prevalence

China has been experiencing a rapid upsurge in overweight and obesity rates since the 1980s [1]. The combined prevalence of overweight and obesity increased by 49.3% from 14.6% in 1992 to 21.8% in 2002 [1]. Generally, obesity prevalence increases along with a country's economic growth and social development. [2] At the same time, 3244 KFC fast-food restaurants have been built in China, and McDonald's promised to have at least 2000 established by 2013 [3]. Consequently, as one of the biggest developing countries influenced by a great impact from Western culture, a surprisingly increased Gross Domestic Product (GDP), a significant change in more energy-dense foods, a decrease in leisure time activity, and a transformation of transportation in the past two decades, Chinese population's waistline has almost risen perpendicularly [4]. Moreover, the health implications of overweight/obesity are especially worrying because many Asian populations experience diabetes and cardiovascular diseases at lower weights compared to other populations [5, 6]

However, China's rapid increase in overweight/obesity cannot be fully explained by the increasing economic status. In a study conducted among 143,522 adults from the Chinese National Nutrition and Health Survey (2002), there are large differences in obesity prevalence between northern and southern China -- regions with similar GDP per capita [7]. Generally, the northern regions tend to have higher BMI and higher prevalence of overweight, particularly in Beijing and Bohai coastal regions (Tianjin,

Hebei, Shandong and Liaoning). In some provinces with relatively higher GDP such as Shanghai, Guangdong and Fujian in southern China, BMI and prevalence of overweight are even lower than Northern cities with lower GDP. Such a phenomenon can be possibly explained by climate and dietary variety, since winter outdoor activity is extremely limited in the north due to the weather (average below 0 °C), and the energy and protein intake is generally higher in the north than in the south [8]. Thus, as the biggest city in the Northern region of China with an explosion of 60% overweight or obese population (BMI ≥ 24 kg/m²) from 1992 to 2002, Beijing could be considered one of the best represented cities for obesity epidemics research in this fast grown period [1, 9].

1.2 Weight loss intervention efficacy in China

In the past 2 decades, numerous overweight and obesity interventions have been conducted among children and adolescents in China. This can be explained by Chinese government's policy. Since 1995, the Ministry of Health and the Ministry of Education in China have been collaborating with other domestic agencies and World Health Organization (WHO) to establish health-promoting schools (HPS). Each school was provided nutrition education for staff, students and families and school meals were designed to meet nutrition balance. The Ministry of Education also issued a policy to encourage students to participate in physical activities at least one hour per day [10]. Numbers of policies has drawn considerable attention to childhood and adolescent obesity.

Unfortunately, compared with childhood and adolescent obesity, very few concerns have been raised for Chinese adults' obesity situation [11]. In a recent systematic review, only 6 of 20 interventions studies were conducted among adults, and only two of them focused on reducing obesity with comprehensive approaches (physical activity, diet and education) [2]. The other four mainly focused on prevention and control of cardio-cerebral-vascular diseases as a tool to reduce obesity [2]. Based on a comparison made by Li between four weight loss interventions in China (physical activity, dietary, medical therapy and integrated behavior change), integrated behavior change (a combination of physical activity and dietary intervention) has been demonstrated by researchers as the most effective and stable approach among the Chinese population [12]. This is consistent with evidence-based weight loss strategies being tested in other parts of the world. It provided a premise and basis of a US-based integrated intervention approach conducted successfully among the Chinese population. Besides, none of these six interventions produced clinically significant outcomes (>5% weight loss) in China [2]. There is a need to develop better interventions for this population.

1.3 Potential for new media research

New media weight-loss interventions are behavior-change interventions interacted with participants individually via email, text messages or website. They have been demonstrated effective compared to traditional intervention methods (low-calorie

diet, increased physical activity and behavioral or cognitive-behavioral therapy) for short-term weight loss in the United States [13,14]. Several studies showed that new media weight-loss interventions are efficacious [14 - 21]. Among all of these studies, compared with participants only receiving internet education materials, those receiving personalized target information and feedback via email from a human counselor or automatic computer-tailored text messages would have better weight-loss outcomes. No significant difference has been found between email and text message as intervention media [19]. However, these studies are mostly conducted among Caucasians, mainly females. Very few studies have been investigated among Asian population. Further studies are needed to find if the new media weight-loss intervention has similar efficacy in Asia, both males and females, as in Western countries.

The interactive Obesity Treatment Approach (iOTA) is a weight-loss treatment strategy in which people are able to self-monitor every day by interacting with one of many technologies, such as a personalized website, interactive voice response phone calls, or text-messages. It was designed because traditional weight loss approaches, such as strict calorie intake and physical activity targets, meal replacements and weight loss medications, have resulted in less intervention engagement and poorer weight loss outcomes, particularly in socially disadvantaged populations [22]. iOTA's library contains 12 behavior change goals for the weight loss phase, and 9 for the weight maintenance phase (Appendix A). All weight loss goals are easily tracked over time, communicated simply and understood easily in order to facilitate long-term self-

monitoring, and self-monitoring has been demonstrated as one of the most important predictors of weight loss in both dietary and physical activity intervention trials [23-25].

To test the efficacy of iOTA principle in the US, 2 studies have been conducted in Cambridge and Boston, MA. Step Up, Trim Down in Cambridge, was the first trial of a 3-month, web-based weight loss intervention in primary care using iOTA [26]. One hundred and one obese and hypertensive patients participated in the study and patients showed greater weight loss than controls without any weight loss counseling. Also, those with high frequency of website logins were demonstrated to have the largest weight losses at the end [26]. Be Fit Be Well in Boston, another 24-month trial including 360 low-income obese patients participating in the iOTA-based intervention, is delivered via the web, or print plus Interactive Voice Responses [27]. Outcomes should be reported at the end of 2011. Both of the studies proved the efficacy of iOTA among self-monitoring weight loss interventions.

Given the importance of regular self-monitoring for weight loss and the significance of new media support such as tailored messaging in self-monitoring weight loss interventions [19, 28], iOTA participants are designed to self-monitor their behavior change progress using interactive text messaging (I-SMS) after being assigned 3 or 4 goals based on the iOTA survey responses. These goals are chosen using an algorithm that prioritizes goals based on their individual need, readiness, barriers, self-efficacy and the intended caloric deficit. The system will generate personalized feedback for the

participants, including motivational messages, skills training content and a report of participant progress towards his/her weight loss goal.

In addition to I-SMS, telephone coaching calls are also offered monthly to enhance and sustain participant motivation and behavioral skills training throughout the course of the intervention. Previous studies have demonstrated that telephone counseling was one of the most cost-effective strategies for disease management [29, 30]. During each call, the coach is responsible for (1) reviewing self-monitoring data (using a centralized database) and emphasizing the importance of monitoring behaviors to the participants; (2) identifying and generating responses to potential barriers; (3) discussing goals regarding barriers to physical activity practices; (4) re-establishing behavior change goals if necessary; and (5) discussing how to engage social networks and community resources. The coaching calls are guided by the principle of motivational interviewing.

In China, among the three major telecom companies, 594.9 million people have subscribed to China Mobile (the largest telecom company in China) by Feb in 2011 [31], along with 171.6 million subscribers in China Unicom and 90.5 million in China Telecom [32,33]. In 2007, the global SMS volume had reached to 19 thousand billion, including 15 thousand billion from Western Pacific region. Nearly half of the SMS volume using in Western Pacific region was from China, which is nearly four times higher than it using in North America [34]. Thus, mobile and I-SMS are widely used among the Chinese

population, which provides a good prospect for the new media technology adaption in China.

Consequently, with the integration of easy-to-understand behavior change goals, web-based intervention, SMS self-monitoring, and timed individual coaching calls, iOTA is demonstrated to contribute to weight-loss interventions. Further studies are needed to determine whether such new media interventions are efficacious among the Chinese population as well.

1.4 Culture translation importance

According to Lau's framework, when the validity of evidence-based interventions is threatened by differences in engagement, cultural adaption is necessary in order to make an effective science-based prevention intervention also culturally relevant [35-37]. Since iOTA was designed mainly based on American lifestyles, cultural translation should be one of the first steps when implementing in China.

Culture is learned, shared, and transmitted from one generation to the next, and it can be seen in a group's values, norms, practices, systems of meaning, ways of life, and other social regularities [38]. All these factors can be strongly associated with health-related behaviors and the acceptance and adoption of health promotion programs. Thus, to make health promotion projects and materials more culturally appropriate, five strategies are usually used for tailoring: sociocultural, constituent-involving, linguistic, peripheral and evidential [38]. Sociocultural strategies are researches about a group's

cultural values, beliefs and behaviors so that researchers would have a better knowledge about the local culture to make the intervention as relative as possible. Constituent-involving strategies are to ensure the local collaborators' experience would benefit the efficacy of the study. Linguistic strategies generally start after intervention materials have been designed to help adapt materials translated to native languages gain better understanding. Finally, peripheral and evidential strategies are usually used during the baseline visit to deliver culturally-tailored informative materials. Researchers need to provide participants appropriate supportive materials and evidence of impact to enhance better engagement. To test the iOTA efficacy in China, we collaborated with researchers in Peking University Health Science Center (PUHSC). Designing the most suitable intervention therapy for the Chinese population has become the primary step of cultural tailoring. In this study, we focused on sociocultural strategies about how iOTA can be translated into a China-based research study using background information researches and formative studies.

2. Purpose of the Study

The purpose of the present study is to propose a possible framework to culturally translate a US-based research project for a Chinese population.

Our first aim is to demonstrate the suitability of a tailored iOTA principle in China and determine the necessary changes to iOTA goals based on a comprehensive literature review and key informant interviews.

The second aim is to gather data regarding the Chinese populations' attitudes towards weight loss by researching their weight-loss history, weight loss motivation and barriers, as well as current lifestyles. These findings may help guide the proper design and release direction of the intervention materials. It can also possibly enhance the impact on the target group.

The third aim is to illustrate the major concerns and barriers of translating a behavior change intervention in China.

3. Methods

In the first phase, we selected major intervention components after completing a high-level overview of Chinese cuisine, cooking style, eating customs, alcohol consumption and physical activity preference. The primary iOTA goal list was first revised based on the difference between American and Chinese lifestyles.

In the second phase, we aimed to make specific cultural adaptations to the intervention content. In order to better understand the population's history, weight-related concerns and barriers during the weight loss process, we conducted interviews using the key informant technique. The key informant technique is an ethnographic research method originally used in the field of cultural anthropology but is now being widely used in social science investigation [41]. It is usually applied to gather qualitative and descriptive data that are difficult or time-consuming to have through structured data gathering techniques [42]. Generally, respondents provide a good deal of qualitative data by answering open-ended questions, but they can also provide valuable concrete quantitative data by taking a short questionnaire surveys. This is one of the best data gathering methods for studies that need to obtain result in a relatively short period of time [41].

3.1 Introduction of the Sino-US Cooperation in SMS Weight-Loss Coaching Intervention

To determine whether the new technology interventions are efficacious among a Chinese population, we developed a project named Sino-US Cooperation in SMS Weight-Loss Coaching Intervention. It is the first obesity intervention study using the iOTA system in a country other than the US. It is a 6-month, two-arm randomized controlled weight loss intervention for 100 overweight/obese Chinese adults aged 30-50 in Beijing.

After completing a baseline survey, participants will be randomly divided into intervention and control groups. The control group will receive health education materials and a group-based brief healthy living education session at the time of randomization. For the intervention group, participants will be assigned 3 or 4 behavior change goals base on their iOTA survey responses after randomization. Then, they will be able to self-monitor by interacting with text-messages every day. During the 6-month intervention, researchers will provide 4 weekly group sessions to enhance participant motivation and monthly coaching calls to discuss about the process, feedback and next step. After both 3-month and 6-month intervention, the researchers will measure weight change (kg) at 3 or 6 months post-baseline as primary outcomes, and also change in blood pressure, waist circumference, dietary intake, physical activity, and psychosocial mediators at 3 or 6 months post-baseline as secondary outcomes. The Sino-US Cooperation in SMS Weight-Loss Coaching Intervention study has been approved by Duke Institutional Review Board (IRB). To study the suitability and acceptance of this

new-media behavior change intervention in China, we designed a pilot interview study among a small number of adults in Beijing.

3.2 Participants

In the pilot interview, 20 adults aged 30-50 years with BMI ≥ 24 [9] were interviewed. The proportion of male to female equals to 4:6, which was the same requirement for the Sino-US Cooperation in SMS Weight-Loss Coaching Intervention. Since the purpose of the study was to gather general information about how to best tailor intervention content for the target population, we did not use additional exclusion criteria.

We recruited participants by posting flyers in the communities inside and around the Peking University Health Science Center (PUHSC) and Peking University Third Hospital (PUTH), which is close to the PUHSC campus. Participants were also encouraged to refer their friends, colleagues or relatives to join the study. We planned to take 5 days for recruitment in February, 2011, but reached the primary goal of 20 participants during the first 3 days.

3.3 Procedure

3.3.1. Recruitment

In order to participate in the interview, people needed to text their sex, age, height and weight to the researcher. After calculating their BMI, we texted back to the

participants to inform them whether they were qualified for the study. All the participants were sent a unique identifier code (e.g. 201101, 201102 ... 201120) by text, and individually scheduled for the interview. Participants needed to provide their code to participate in the interview.

When participants arrived, they were provided general information, which is described above, about both the Sino-US Cooperation in SMS Weight-Loss Coaching Intervention and this focus group interview. Participants were also informed about data privacy and incentive policies. Then participants provided informed consent. Each participant received an incentive in the amount of 45 CNY (about \$7) after the interview.

3.3.2 Interview Questionnaires

The interview was a 20-minute survey including both multiple choice and open-end questions. It was divided into 5 sections: Demographic information, Weight loss history, Physical activity preference and recent lifestyles, iOTA goal review, and Intervention methods review.

Demographic information collected mainly included participants' provided name, sex, height, weight, BMI, birth, age, ethnic groups, education, profession, number of family members over 18 and family income. This questionnaire was drawn from the World Health Organization (WHO) STEPwise approach to chronic disease risk factor surveillance (STEPS) instrument [43].

The weight loss history section included a dichotomous item about whether they have tried to lose weight, a multiple choice question about what methods they have used before (with a list of physical activity; diet option including Special weight-loss recipe, Decreasing food intake, Decreasing number of meal, Low Carbohydrate and low fat; Weight-loss drink (tea); Western medicine including Drug and Surgery; and Chinese traditional medicine including Herbal medicine, Acupuncture, Massage, Cupping and Finger pointing) and 4 open-end questions on weight loss motivation and barriers (i.e. Please list three reasons that best encourage you to lose weight. How about people with similar age and background with you? Please list three reasons that stopped you while losing weight. How about people with similar age and background with you?). For each weight-loss method, we asked about whether it successfully produced at least three jin (1.5kg) weight loss per month (Jin is a common unit for weight in China. 1 jin = 0.5kg) since 1.5kg/month has been indicated by Chinese experts as the most effective and healthy weight loss speed for Chinese population [44]; if it did not, four response options were provided in the reason column as multiple choices: A = lack of perseverance, B = improper usage, C = the method is misleading, D = others, please specify.

In the physical activity preference and current lifestyle section, several physical activities were listed with questions about each one's strength, duration, frequency and location for participants to choose. We also designed multiple choice questions asking

about whether they drove to work, how many hours they spent sitting per day and what activities they did after work.

The last two sections are iOTA goals and intervention methods review. The survey listed the entire iOTA goal library as well as intervention methods that would be used in the real study, including text messaging, coaching call, and group sessions. For each goal and intervention item, we asked participants 2 dichotomous questions about whether they think the goal is relevant to weight-loss and whether they think they can reach the goal using specific methods. This session helped to demonstrate whether the tailored iOTA goal and intervention methods were acceptable for Chinese people and also provided us valuable suggestions to generate a series of more suitable intervention materials.

In the end, participants were asked if they would like to participate in the Sino-US Cooperation in SMS Weight-Loss Coaching Intervention and why. They could leave contact information for us to inform them at the beginning of the recruitment.

3.4 Data Analysis

Final data analysis used thematic extraction for qualitative data. Quantitative data were analyzed using STATA software. Since most of the iOTA items were largely accepted in the study, key themes were extracted when mentioned or repeated by more than 20% of participants. Themes were also selected when comments were mainly about cultural factors, which are typical in China but do not commonly exist anywhere else.

Excel was used for data input and STATA was used for analyzing gender differences by chi-square.

4. Result

4.1 Pilot Interview Study

4.1.1 Demographics

During the 5-day recruitment, 38 people texted to participate in the interview, of which 20 (52.6%) scheduled an individual face-to-face interview, 5 did not show up and 2 did not meet age requirements. Eleven participants did not have time to come for interview but were eager to participate in the study, so we sent out the paper-based survey instead. In this study, we used only data from the 20 interviewed participants for analysis, since a face-to-face interview is more informative than simple survey completion.

In these 20 participants, the proportion of male to female is 4:6. The sample was mostly in their 30s, mildly obese, from the Han ethnic group, had an undergraduate degree, nongovernment employees and had only 2 people in the family over the age of 18. Most participants' monthly family income is in a range of 1,000-5,000 CNY (\$150-770) or 8,000-12,000 CNY (\$1200-1800). (Table 1)

Table 1: Pilot Interview Demographics

Demographics		
	Number	Percentage
Total Participants	20	
Female	12	60%
Male	8	40%
BMI		
24≤BMI<27 (Overweight)	6	30%
27≤BMI<30 (Mildly obese)	10	50%
30≤BMI<35 (Severely obese)	4	20%
Age		
30-34	6	30%
35-39	6	30%
40-44	5	25%
45-50	3	15%
Ethnic group		
Han	19	95%
Man	1	5%
Education		
High School	4	20%
Undergraduate	9	45%
Graduate	7	35%
Profession		
Nongovernment employee	20	100%
University administration staff	10	50%
Nurse	5	25%
Laborer	3	15%
Researcher	1	5%
Enterprise employee	1	5%
Number of family member over 18		
2	13	65%
3	1	5%
4	3	15%
5	2	10%
6	1	5%
Family income per month (CNY)		
1000-5000	7	35%
5000-8000	4	20%
8000-12000	7	35%
12000-15000	2	10%

4.1.2 Weight loss history

According to the survey, 19 out of 20 participants had attempted to lose weight, but only one of them had continued for more than 1 year. The majority of people did not have a specific weight loss plan but tried several methods for a short period (less than a month) and stopped once they could not see the outcome rapidly. Among all proposed weight loss methods, physical activity (65%) and decreasing food intake (60%) were the two most common approaches identified. More than 60% of participants reported succeeding in weight loss (had lost weight for at least 3 jin/1.5kg during the first month) using these two approaches. Decreasing the number of meals and massage, a traditional Chinese weight loss therapy, was tied for the third place (25%). Each percentage was out of all selected. (Figure 1)

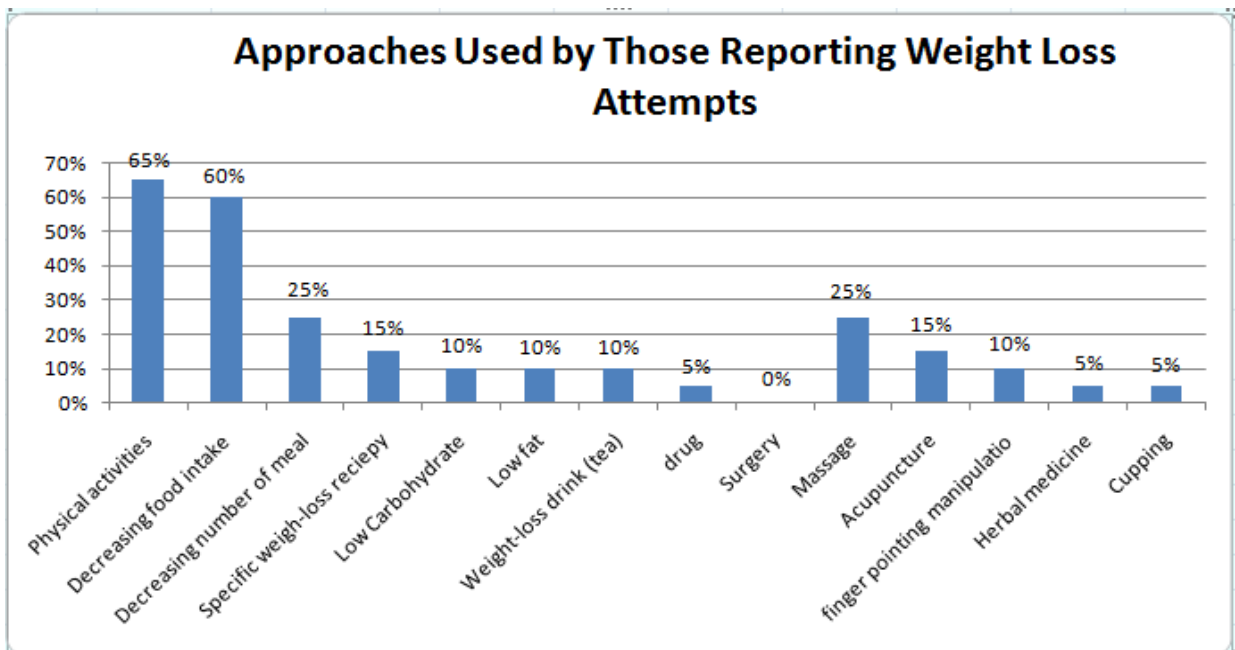


Figure 1: Pilot Interview - Approaches Used by Those Reporting Weight Loss Attempts

4.1.3 Weight loss motivation and barriers

Table 2: Pilot Interview - Reasons to Lose Weight

Reasons to lose weight			
	Number	Percentage	Notes
Health	20	100%	Current disease: <ul style="list-style-type: none"> - 20% fatty liver - 20% hyperlipemia - 10% hyperglycemia - 5% hypertension
Keep fit	12	60%	- 75% are female participants
Need more energy	6	30%	- 67% are male participants
Family influence	3	15%	<ul style="list-style-type: none"> - Their kids want them to keep fit; - They need to set up a good model in case their kids will become fat as well; - Kids may prevent them from going to school because they are too overweight.
Need confidence	1	5%	
To look younger	1	5%	

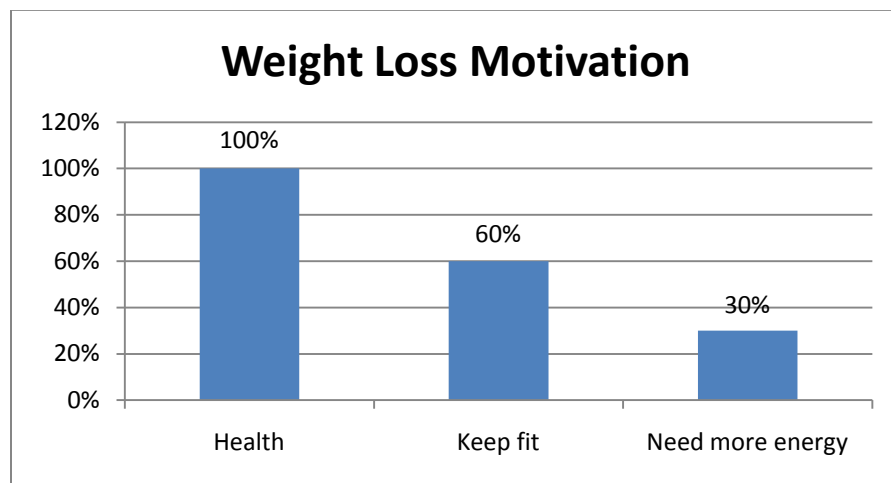


Figure 2: Pilot Interview - Weight Loss Motivation

As shown in Figure 2, all the participants considered health as their prior motivation for weight loss. Among the 20 people, 20% have fatty liver, 20% have high blood lipids, 10% have hypoglycemia, and 5% have high blood pressure. “Keep fit” (including “slimness” and “looking better”) is in second place. Although 75% of people who chose this factor were women, no significant gender difference was displayed ($P>0.05$). “Need more energy” is in the third place with 67% males choosing this factor. Gender difference was not significant ($P>0.05$).

There are other reasons indicated by small number of people: needing confidence, to look younger, and family influence. Particularly for those who indicated that they were influenced by family members, children are their biggest motivation. (Table 2)

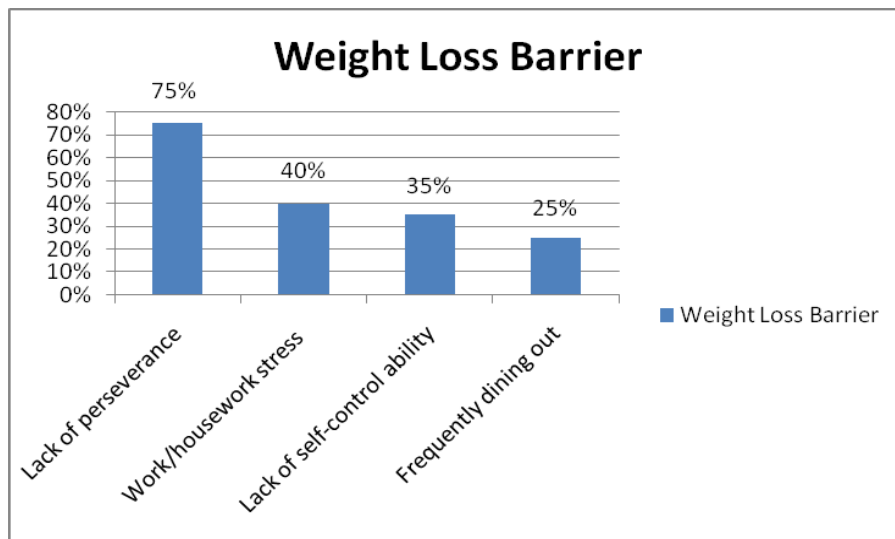


Figure 3: Pilot Interview - Weight Loss Barriers

Figure 3 indicated the top 4 barriers participants usually encountered during the weight loss process. Besides a lack of perseverance and self-control ability, 40% participants chose work/housework stress. Frequently dining out took the 4th place.

Men were more likely than women to report eating out more than once a week compared to only one female in this situation ($P < 0.001$).

4.1.4 Physical activity preference

Among all the participants, only 15% drove to work every day, while 30% rode bicycles. Jogging was the most preferable physical activity. 70% indicated that they usually jog to work or after work, but no longer than 20 minute per day. 15% had the habit of daily jogging for at least 40 minute per day while 30% only jogged less than twice a week for around 30 minute every time. Besides jogging, swimming was another popular activity with 25% preference. However, only 2 people indicated that they swim every 2-3 days and the others went swimming less than once a month.

In addition, watching TV, dining out and surfing on the internet were the major activities after work, compared with only 30% doing physical activities. (Figure 4)

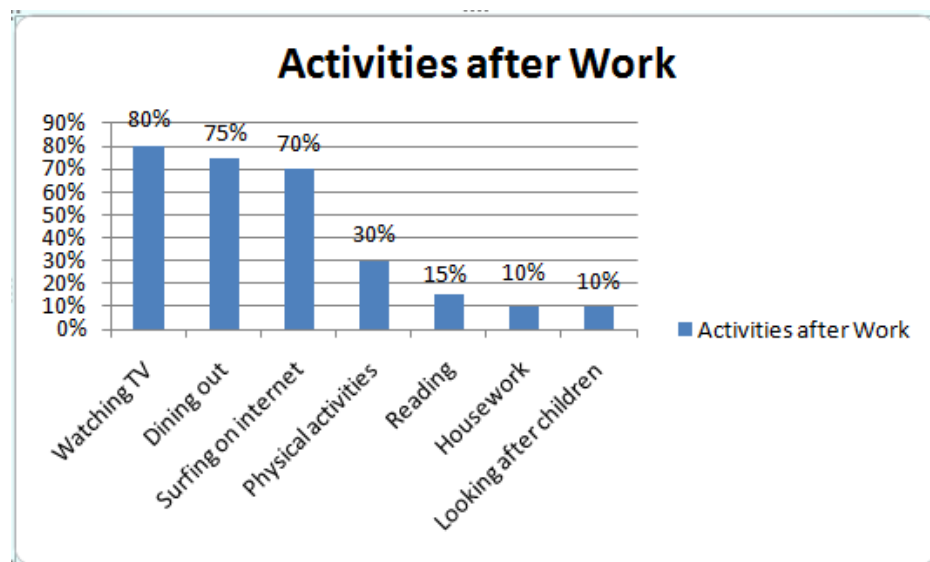


Figure 4: Pilot Interview - Activities after Work

4.1.5 iOTA goal comments

Among the 16 iOTA goals that remained after the first round modification, all of them have more than 80% acceptance (participants indicated that they can reach the goal) except “Red meat no more than 1 time per week”. Only 60% people had confidence to reach that goal. By contrast, 85% people preferred to have “No more than 2 servings (about 6 Liang/300g) of meat per day (any kind)” since it is easier to complete. In addition, 50% of those who preferred this goal had indicated that the portion of 2 servings of meat are too much for them to eat every day, especially for shredded or minced meat. They suggested decreasing the portion or categorizing it by different types of meat.

Even though mostly accepted by participants, several key themes have been extracted from the goal list with cultural concerns and comments from participants and they are listed in Table 3, if mentioned or repeated by more than 20% of participants, or if they were mainly about cultural factors, typical in China but not common anywhere else.

Table 3: Pilot Interview – iOTA Goal Key Items Acceptance and Comments

Goal Name	Acceptance	Themes
Eat at least 2 cups or More Fruits & Vegetables each every day	85%	<ol style="list-style-type: none"> 1) Many eat in the cafeteria or restaurant for lunch and have few choice of food. 2) Most people do not have habit to bring food to work, since most Chinese food need to be heated. 3) 3 (2 male, 1 female) people indicated that they don't cook themselves, so they have no choice of food.
No Late-Night Snacking	80%	<ol style="list-style-type: none"> 1) Working overtime is extremely common in China, so suggestions are needed about some options when feeling hungry after working at night. 2) Companies usually buy fast food for employees when working overtime.
Red Meat no more than 1 time per week	60%	<ol style="list-style-type: none"> 1) People eat together in the family, so they need to make sure that their kids are having "healthy dinner" with meat to ensure protein intake. If eating separately, they need more time for cooking. Most of them don't have that time.
No more than 2 servings (about 6 Liang/300g)of meat per day (any kind)	85%	<ol style="list-style-type: none"> 1) Belief that it is necessary to consume meat daily 2) Need proper portion of meat for daily intake, particularly when measuring shredded or minced meat, which is typically served in Chinese cuisine.
Get 7-8 Hours of Sleep Each Night	80%	<ol style="list-style-type: none"> 1) Participants who have shift work or live far away from workplaces found difficulties in sleeping enough time. 2) Taking a nap at noon is generally possible, but only for those with at least 2 hour spare time at noon. People with shift work usually do not have lunch spare time.

4.1.6 Intervention approaches comments

All of the three intervention approaches: daily text messages, coaching call and group sessions were highly acceptable for the pilot interview participants, even though 20% indicated that they may have difficulty in coming to the group sessions. Four out of

20 participants don't have time for these sessions whether during weekdays or weekends. Two out of 20 people reported feeling embarrassed when talking about private issue in front of strangers.

4.2 Final revision

4.2.1 iOTA goal list revision

Table 4: iOTA goal list revision

Original Goal	Revised Goal	Reason for the revision and additional assist
Eat 5 or more fruits and vegetables	Eat at least 2 cups (about 7 servings) or More Fruits & Vegetables each every day	<ol style="list-style-type: none"> 1) In China, food is not counted by serving, so we will use measuring cup or other common container as a unit for measuring vegetables and food. 2) Vegetables are a major course in Chinese cuisine that one can hardly avoid in each meal [45], and DASH eating plan suggested eating as much whole fruit as patients want [46]. So we increased the amount of vegetables and fruit intake since the original goal is easier to complete for Chinese than US population. 3) Need to provide educational materials for those who do the cooking at home, in order to gain their support. 4) Need to provide special training for people dining out frequently either at restaurants or school cafeterias, to enable them to choose and eat proper foods.
No chips, cookies, or candy	No Packaged Snacks or Street Food	<ol style="list-style-type: none"> 1) Chips, cookies or candy are not as popular as in the US. 2) Various packaged snacks are sold particularly in Chinese market [47]. 3) Street food is very popular.

Table 4 (continued): iOTA goal list revision

Original Goal	Revised Goal	Reason for the revision and additional assist
No snacking or dessert after dinner	No Late-Night Snacking	<ol style="list-style-type: none"> 1) Dessert is not usually served after dinner in China, but late-night snacking happens more frequently [45]. 2) Need to provide options for people working overload/overtime
Walk 7,000/10,000 steps	Walk 7,000/8,000/10,000 Steps every day	<ol style="list-style-type: none"> 1) People who do not walk/jog every day need to start walking at a lower aim and increase the goal step by step
Red meat no more than 1 time per week	Red meat no more than 3 times a week	<ol style="list-style-type: none"> 1) Red meat is one of the major cuisines in Chinese diet [45]. 2) We proposed “No more than 2 servings (about 6 Liang/300g) of meat per day (any kind)” as a 2nd option, but 20% people indicated that it is too much for who wants to lose weight. 3) Investigators also concerned that people can hardly lose weight by eating 2 servings of meat per day along with other sides.
No sugary drinks (soda, juice, energy drinks, chocolate milk)	No sugary drinks (soda, juice drink, energy drink with sugar, sweetened milk or tea drinks)	<ol style="list-style-type: none"> 1) Sweetened milk and tea drinks are very popular in China [48].
No More than 1 Alcoholic Drink	No More than 1 Alcoholic Drink (1 drink is about 360 ml beer, 150 ml red wine, 50 ml liquor)	<ol style="list-style-type: none"> 1) Beer, wine and liquor are most popular alcohol in China [49].

Table 4 (continued): iOTA goal list revision

Original Goal	Revised Goal	Reason for the revision and additional assist
Do brisk activity 30 minutes a day at least 5 days a week	Delete	<ol style="list-style-type: none"> 1) We integrated this goal with the goal of “Walk 7,000/8,000/10,000 Steps every day” 2) In China, jogging is translated close to fast walking, and it is the cheapest and most popular physical activity according to the pilot interview study.
Eat whole grains instead of white grains	Delete	<ol style="list-style-type: none"> 1) White grains, such as rice and wheat, are one of the major cuisines for Chinese population [45]. 2) Whole grains food is very limited in the Chinese market [50]
Use a salad plate & small fork at meals	Delete	<ol style="list-style-type: none"> 1) Food containers are different and various in China
No added fats (mayonnaise, creamy dressings, butter)	Delete	<ol style="list-style-type: none"> 1) Fats are not usually used at table but added during cooking [51]
Get 7-8 Hours of Sleep Each Night	No Change	<ol style="list-style-type: none"> 1) We can suggest taking a nap at noon for those with more than 2 hour spare time after lunch. 2) Need more suggestions for people with shift work
Switch to Low-Fat Dairy (instead of high fat dairy)	No Change	
No Western Fast Food	No Change	
No Fried Food	No Change	
Eat Breakfast	No Change	
TV for less than 2 Hours	No Change	
Weigh Yourself Every Day	No Change	

4.2.2 Intervention approaches revision

Table 5: Intervention Approaches Revision

Intervention approaches	Revision	Reason of revision
Four Group sessions	Three group sessions	1) Group sessions are extremely important for weight loss education and materials delivery. 2) 20% people indicated that they were too busy to join. 3) A large number of Chinese people don't feel like talking in the public, because "silence is gold" and "modest is the best behavior" are the notions that have been last for histories [52]
Daily text message	No change	
Monthly coaching call	No change	

5. Discussion

The iOTA principle of integrating behavior change with new technology including daily text messaging, monthly coaching calls and group sessions can be generally accepted and used among a Chinese population with minor cultural modifications. Since iOTA is designed to promote short-term self-monitoring, such acceptance can make the future self-monitoring study, the Sino-US Cooperation in SMS Weight-Loss Coaching Intervention, much easier because patients are likely to believe that they can achieve the goal.

Particularly, since “Red meat no more than 1 time per week” was the only iOTA goal that was largely resisted by participants, we changed the frequency into “no more than 3 times per week” as a more lenient requirement. Although most people considered group sessions relevant to weight loss, some of them indicated that they may have difficulty attending the sessions because of shyness or lack of time. Based on the pilot interview findings, weight loss education is extremely in demand, not only for the participants, but also for their relatives’ support while losing weight. We need to provide recommendations of food to bring and methods of self-control for people frequently dining out. Nutrition education is also in need for those in charge of cooking at home, especially nutrition balancing and food preparation strategies, such as reducing added oil while cooking. For those who thought a healthy meal should include meat to ensure protein intake, we need to provide other healthy protein options as a substitute. We should also provide late-night snack substitutes and sleeping options for people

working overload/overtime or having shift work. Since group sessions are the best way to distribute nutrition and weight loss education, we decided to keep this component but decrease the number of sessions from 4 to 3 in total. Because most of Chinese people are used to keeping silent in public due to historical reasons [52], we will decrease the discussion part in the group sessions and basically focus on weight loss education.

According to other findings, physical activity (especially jogging) and dieting are the primary options for losing weight among the Chinese population. Traditional Chinese Medicine (TCM) (herbal medicine, massage, finger point massage, and acupuncture) has been popularly-used due to its crucial role in disease prevention and treatment for ages in China, and it has been proved slightly effective for weight loss, but only a small number of people have confidence in and perseverance for using it and very few studies has proved its effectiveness. Thus, we will clearly focus on physical activity, but not on TCM therapies, because of the limited empirical support. This finding has built a foundation for delivering the behavior change intervention using iOTA successfully in China.

In addition, health and keeping fit (including slimness and looking better) are the biggest considerations for losing weight, while lack of perseverance and social stress are perceived as the biggest barriers among the Chinese population. These findings are not exactly the same as in the US. For American citizens, slimness is the biggest motivator, while vacation, searching for faster and fad diet and social stress are the major reasons for dropping out of weight loss interventions [53, 54]. The intervention materials for a

Chinese population need to be modified and focus more on health and perseverance to better fit the different population. In the meantime, since Chinese eating culture, work stress and family stress have become the top concerns that cause difficulty in reaching the goals, and more attention is needed on these factors throughout the entire study to ensure participants' retention.

The Northern region of China is the area above the Yellow River (including Beijing, Hubei, Henan, Shanxi, Shandong, Neimenggu, Xinjiang, Jilin, Liaoning and Heilongjiang) [55]. In Northern areas, wheaten foods, such as noodles, buns, dumplings, wheat pancakes and congee are preferred over rice products. Animal products are extremely popular and have become one of the major foods for populations living in this area. People consider meat as healthy for protein intake even though it is a major source of calories. That may explain why the goal of "Red meat no more than 1 time per week" is largely resisted by study participants. Relatively, the other option of "No more than 2 servings (about 6 Liang/300g) of meat per day (any kind)" is more acceptable. However, in Chinese cuisine, meat is usually shredded or minced while cooking [55]. Two servings of meat as pieces may not equal the same serving size of meat after being shredded or minced. Two servings per day could also be too much for those who want to lose weight. Moreover, meat requires more oil for cooking, which is an additional source of calories. Decreasing meat intake is necessary. As a result, we recommended having red meat no more than 3 times a week as a more proper goal and would design an intervention in the group sessions to educate people on eating more lean protein, such

as chicken, fish and tofu, instead of red meat, and we would also provide nutrition information for each kind of alternative protein source for support. Since wheaten foods contain an almost equal amount of calories as pork, a limitation for wheaten foods may be considered as an addition to the goal list.

Not only the limitation of wheaten foods, but also a winter plan is needed for the study. The Sino-US Cooperation in SMS Weight-Loss Coaching Intervention is scheduled to start in June 2011 and will end before January 2012, which means the participants will experience half of the study period during the winter. It is extremely cold and windy in Beijing during the winter and people can hardly go outside for any activity. It is also a custom through ages for Northern people to increase food intake in autumn in order to gain more fat for winter, since they believe that fat can help them in keeping warm [56, 57]. Accordingly, a specific winter plan, including in-door activity options, such as climbing stairs and rope skipping may be necessary.

In the iOTA goal comments, a large number of participants indicated that they did not have many choices for food because 1) they are not in charge of cooking at home; 2) they usually eat in the university cafeterias for lunch; 3) when working overtime, companies usually buy employees boxed meals or western fast food; and 4) they have to dine out for banquet-style social events. This finding is consistent with the literature showing that the Chinese population is eating out much more frequently than in the past decades. As the major factors of the obesity epidemic in China, these phenomena need to be stressed in our intervention strategies development.

Firstly, we need to provide educational materials for family members who are in charge of cooking at home to gain their support. Secondly, for those eating in the cafeterias for lunch, we can suggest that they bring cooked lunch themselves. Chinese cuisines can usually only be eaten after warming them up. This could possibly explain why people working on the campus usually choose to eat in the cafeteria only. However, microwaves are now widely provided in the public cafeterias, especially in the enterprise companies and the area that the study will be conducted. This ensures that warming up the healthier homemade lunches is feasible. We can also provide suggestions of how to select meals and resist certain dishes while eating in the cafeterias or restaurants, or by provide examples of healthy meals without a need for heating, like sandwiches and sushi.

Working overtime and dining out are two typical phenomena in China. It is well-known that China has been experiencing rapid economic growth recently, so the atmosphere of competition has become increasingly severe, especially in big cities like Beijing. Working overtime is extremely common in most governmental and non-governmental organizations. Large numbers of participants in the pilot interview indicated that they have little energy and time left after work for any activities. These are all affected by chronic stress from work and chronic stress is relevant to being obese by causing metabolic and cardiovascular disorders, and eating “comfort foods” may directly reduce of the negative effects of the chronic stress network on behaviors and neuroendocrine outflow through glucocorticoids stimulation [58, 59]. Work stress also

has influenced people's sleep quality. Some people, especially nurses, indicate that they have difficulty getting enough sleep because of the intensive shift work. This brings trouble when completing the iOTA goal of "Get 7-8 Hours of Sleep Each Night".

Inadequate sleep has been demonstrated to be strongly associated with an overweight or obese status. It is a common phenomenon among obese population and may be contributing to the high rates of obesity [60, 61]. We need to help participants with sleeping problems figure out how to have enough sleep without detracting from work, such as methods to get rid of stress or ideas for going to bed earlier. More intervention materials would be needed here.

Working overtime is not the only cause of chronic stress from work. Banquet eating and drinking are recorded to be used for social and ceremonial occasions in China for ages, and banquet style is much more preferable than solitary style because of Confucian philosophy. In Confucian philosophy, society is like a big family, so everyone should treat the others like family members. Therefore, in order to become closer to each other, people use banquet eating and drinking as connection to express intimacy and respect [62]. However, as the society is becoming more and more competitive, increasing numbers of people start using banquet eating and drinking as a tool and even part of work to maintain good relationships with supervisors or colleagues. This phenomenon not only increases food intake and alcohol consumption, but also may be related to the aggravating work stress in China. It markedly influences males' lifestyles, since males are considered the major support in a family, responsible for the social status of the

family and himself. This might help to explain why the study results show that most male participants eat out more than 3 times per week. Particularly, studies showing that laborers, government officials, administration staff, and technologists have the highest alcohol drinking rates [63-65]. Unfortunately, we do not have many enterprise or government employees in the pilot interview sample, so it is not clear whether people will be receptive to this goal or not. Since banquet drinking is a major part of the social system, we need to develop approaches to help people cope with the social activities without drinking.

Consequently, the intervention approaches and iOTA goal selection may need to occur separately for people of different occupations, and those who usually dine out or do not cook on their own. For example, giving suggestions to those usually work overtime about what to eat when feeling hungry at night; encouraging homemade lunches and providing lunch samples for those usually eating in cafeterias; and giving suggestions about self-control when dining out.

As demonstrated in the weight-loss barrier section of the study, family stress is accompanied with work stress and has become one of the biggest obstacles to losing weight. In China, Confucian philosophy has been acting as a major belief in the 5000-year culture. It expounds the harmony of the individual within the family and society [66]. This historical philosophy strongly treasures family units but not individuals, which establishes a Chinese culture based on a family notion: unless you can stabilize your family, you would be able to stabilize the country and the world [67]. And in

Chinese notion, to stabilize and flourish in a family is dependent on children's education, so that the family can succeed in the following generation. China's One-Child policy fueled this notion since the child could be the only hope for the family's future. In a survey conducted in Hubei Province among 1293 children from primary schools, 74.4% fathers and 83.4% mothers would usually be accompanied with their children if they are only child in the family, compared with 55.9% fathers and 61.3% mothers if they have more than 1 child in the family [68]. Most of our participants, whose age is between 30 and 50, have only one child under age of 18. They are more likely to spend time being accompanied with their children and that explains why household duties and family needs have occupied most of their time after work.

However, we can also use such family notion to contribute to the weight loss process. As mentioned before, one of people's possible motivation is family concern. Some kids dislike the idea that their parents might be overweight and some parents want to set up a good model for their kids to prevent the possibility that they will become overweight in the future as well. This notion can be used while distributing the intervention ideas. Besides, some participants have inquired if they can bring their spouses into the study. They feel supported and more motivated to lose weight when participating as a couple. This corresponds with the role of social support in many behavior science interventions. It is widely shown that social support (i.e. family, friends, school and workplace) benefits healthy behaviors and leads to a good long-term health outcomes, such as having a better immune function, lower blood pressures and

reduced mortality [69, 70]. Consequently, we can possibly encourage participants to participate in study activities with their spouse, colleagues or neighbors. Secondly, during the group session, we can divide participants into cohorts by workplace or living address, so that those who can meet each other could set up weight-loss plan in partnership for mutual supervision and support. However, since not all participants would prefer working with partners, this factor may need to be stratified during data analysis to distinguish the influence of social support and iOTA interventions.

The most unexpected finding is people's resistance to group sessions. During the first phase of intervention design, based on literature suggesting the importance of social support to Chinese populations, 4 weekly group sessions were added into the intervention approaches, in addition to daily text-messaging and the monthly coaching call. The design of the group sessions was adapted from two studies: Weight Loss Maintenance (WLM) and PREMIER [39, 40]. However, in the pilot interview study, 20% people showed resistance to group session. This may be possibly assigned to the overload of work and family influence as well. People sometimes need to work during the weekends and even if they do not, they would probably reserve the spare time for their family, especially children. Besides, a small number of people indicated that they felt uncomfortable talking about privacy, especially a defect (most people consider overweight/obesity as their defect) in front of the public. Therefore, the 4 weekly group sessions may need to decrease into 3 instead. We can move the first 2 group sessions to the beginning of the intervention and also make them close to each other, and leave the

last group session in the middle of the intervention. We would structure the group sessions in this way because people's highest participation usually happens at the starting point of an intervention.

The pilot interview study may have some bias due to the small sample size and limited recruitment region. Most participants are from medical university or working in a hospital. Their lives are much easier and simpler than enterprise or government employees. For example, they are rarely forced to dine out or join in banquet drinking for work and social activities. Further research is need for various occupations. Besides, the demographics information was self-reported, including height and weight. This may bring inaccurate data to the study. The survey questions were designed mainly based on interventionists' experiences but not existed studies. This makes the comparison of US and Chinese weight loss motivation and barriers less persuasive and brings difficulties to study the demand of cultural translation.

This study generates a possible framework of cultural translation from a US-based research to fit into Chinese population: the integration of background information review and a key informant interviews. It has demonstrated the usability of the tailored iOTA goals in China and has helped with minor cultural modifications on red meat intake and group sessions frequency. By researching Chinese populations' attitudes towards weight loss, researchers have developed an appropriate direction for intervention materials design and release to focus on health concerns, perseverance, special eating habit, as well as family and work stress. More suggestions are needed in

the released intervention materials based on unique Chinese eating habits, such as the food proportion, food variety, and ways of eating and cooking. It would help to enhance the intervention impact as well as retention for the target group. However, the occupations of the pilot group are not diverse enough, so more studies are needed for professions other than university staff and medical staff.

To conclude, this study has demonstrated the possibility of using iOTA principle in China and the success of a possible cultural translation framework. Even though the target group was not diverse enough, it contributes to laying the groundwork of the new media, self-monitoring intervention, and the idea that it can be conducted successfully among this population in the future.

Appendix A

iOTA Goal Library	
Phase 1: Weight Loss	Phase 2: Weight Maintenance
<ul style="list-style-type: none"> • Walk 7,000 steps • No sugary drinks (soda, juice, energy drinks, chocolate milk) • Eat 5 or more fruits and vegetables • No chips, cookies, or candy • No fast food • No fried food • Eat breakfast • TV for less than 2 hours • No snacking or dessert after dinner • No more than 1 alcoholic drink • Do brisk activity 30 minutes a day at least 5 days a week • Red meat no more than 1 time per week 	<ul style="list-style-type: none"> • Walk 10,000 steps • Weigh yourself every day • Do strength training 2 days per week • Eat breakfast • Watch TV for less than 2 hours • Get 7-8 hours of sleep every night • Eat whole grains instead of white grains • Use a salad plate & small fork at meals • No added fats (mayonnaise, creamy dressings, butter)
<p>Sample iOTA Survey Questions:</p> <p>1a) In the last month, how often did you eat breakfast?</p> <ul style="list-style-type: none"> a) Never b) 1-3 times last month c) 1-3 times per week d) 4-6 times per week e) Every day <p>1b) Which of the following best describes what you would think if asked to eat breakfast every day?</p> <ul style="list-style-type: none"> a) It would be easy to change. b) I would try to change. c) I don't want to change. 	

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