Annie Chen. Food in Context: Food Choices, Eating Habits and Health Information Behaviors among Japanese University Students. A Master's Paper for the M.S. in I.S. degree. July, 2010. 120 pages. Advisor: Barbara M. Wildemuth.

This study had the following aims: to perform a multidimensional, multi-method assessment of the food choice motivations of Japanese university students, to identify subgroups among them that shared similar food choice motivations, and to determine if those groups could be distinguished from each other based on personal characteristics, eating habits, and health information behaviors. The data collection phase consisted of two parts: a limited number of semi-structured interviews used to adapt a questionnaire survey for use with a Japanese population, and a questionnaire survey. Factor analysis of the survey responses revealed seven factors: consumption experience, convenience, health, weight control, content, familiarity and price. Cluster analysis of the factor scores for each student generated five subgroups. Chi-square tests and univariate ANOVA demonstrated that differences between the groups existed in terms of gender, living situation, snack and fruit consumption, desire to change eating habits, information use and trust of health information sources. Based on the results of this study, recommendations concerning nutrition education for Japanese university students, targeted interventions for particular subgroups, and implications for the Food Choice Questionnaire as a multidimensional assessment of food motivations are discussed.

Headings:

Food

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Use Studies

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FOOD IN CONTEXT:
FOOD CHOICES, EATING HABITS AND HEALTH INFORMATION BEHAVIORS AMONG JAPANESE UNIVERSITY STUDENTS

by
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Introduction

Food is a substance that can be many things at once: mundane, inspiring, stimulating, sustaining, pleasing. Eating too may mean enjoyment for some, stress relief for others, nourishment or perhaps simply a chore. As people, we all interact with food on a daily basis, and this interaction is shaped by a variety of influences such as personality, school, work, personal health, family and friends – the products of our "life contexts."

This study focused on one group of individuals and their food interactions: Japanese university students. For many, the university years are a time of constant activity and stimulation. Each day, students may have a variety of responsibilities: classes, part-time jobs, clubs, social activities and home. The food that they consume keeps them going.

It is lunchtime. Students mill about, some on their way to the cafeteria, others to the convenience store to buy an o-bento (lunch box) or some okazu (side dishes) to get by. In the late afternoon, the students gradually leave campus. They may head straight home where there is a hot dinner and family waiting, or perhaps something else intervenes – they are hungry or tired, so they decide to pick up pre-prepared food on the basement food floor of a nearby department store, or perhaps they go shopping and are enticed by the crowd in front of a new restaurant that has just opened.

The food decisions that students make not only shape their day-to-day experience, but also set the stage for their long-term health and well-being. In Japan as well as other countries, diet, lack of exercise and gradual transition to a sedentary lifestyle has led to an increase in obesity and other related conditions such as cardiovascular disease and diabetes

(Yoshiike, Kaneda & Takimoto, 2002). Concern regarding lifestyle-related diseases was the impetus for Japan's Third National Health Promotion Program, "National Health Promotion in the 21st Century (Health Japan 21)," launched in 2001 (Udagawa, Miyoshi & Yoshiike, 2008). The ten-year plan encompasses nine areas: Nutrition and Diet; Physical Activity and Exercise; Rest and Mental Health; Tobacco; Alcohol; Dental Health; Diabetes; Cardiovascular Diseases; and Cancer.

The Nutrition and Diet area is comprised of 14 items divided among three categories: "Relationship to disease and health: nutrition status and nutrition (food) intake level"; "Factors contributing to behavioral change: knowledge, attitude, and behavior"; and "Environment-building for support of behavioral change: environment level." At the mid-term evaluation of Health Japan 21, there was some improvement in eight of the 14 items, but the improvement did not reach target levels (Udagawa, Miyoshi & Yoshiike, 2008). For example, the recommended level of vegetable intake per day was 350 g; however, there was no net increase from the baseline value of 292 g. Moreover, the average vegetable intake in the 20-29 year cohort was approximately 70 g lower than the age group of 60-69 years. The number of males aged 20-29 years who skipped breakfast had risen from 32.9% to 34.3%, as compared to a target value of 15% or less. Among females aged 20-29 years, the percentage of those who were underweight (BMI<18.5) had decreased from a baseline value of 23.3% to 21.4% at the mid-term evaluation point, but was still far from the target value of 15% or less. Thus, the results of the mid-term evaluation demonstrate that that there is still a great need to improve diet and eating habits in Japan.

As evinced by the Diet and Nutrition items of Health Japan 21, knowledge, attitude and behavior are regarded as integral components of behavior change. People need to know how much and what they should eat; they need to be motivated to eat healthfully or to desire to improve their diet; and lastly, they need to actually exercise healthful behaviors. Although there has been previous research concerning each of these subjects, there has been relatively less attention devoted to the connections between nutritional knowledge, attitudes and behaviors in Japan.

This study was designed to address this gap in the literature by investigating nutritional attitudes and behaviors, and to explore their connection to health information use and trust among a sample of Japanese university students. As the basis for this research, the study employed the Food Choice Questionnaire, a multidimensional instrument developed to assess food choice motivations (Steptoe, Pollard & Wardle, 1995). There were three primary research questions:

- What are the food choice motivations of Japanese university students?
- Can subgroups be identified among the sample that share common food choice motivations?
- Are these subgroups distinguishable from one another based on personal characteristics, eating habits and health information behaviors?

Literature Review

This literature review has three objectives: to examine existing research regarding food choice among the Japanese; to review the development of the Food Choice Questionnaire and its applicability to a Japanese population; and to review literature on health information behaviors in Japan.

Examining Food Choice in Japan

Various factors may affect food behavior. One factor that has received significant attention in past years is body image and weight concerns. A number of researchers (Mukai, Kambara & Sasaki, 1998; Kiyotaki & Yokoyama, 2006) have observed a relationship between social approval, dieting and eating disturbances. In their study of 265 female university students in Japan and Korea, Sakamaki, Amamoto, Mochida, Shinfuku, and Toyama (2005) found that, although the majority of subjects (74%) had a Body Mass Index (BMI) that fell in the normal category, the BMI they considered to be ideal was in the underweight category. In a study including both male and female students recruited from two different Japanese universities (139 females and 84 males), Kagawa, Kuroiwa, Uenishi, Mori, Dhaliwal, Hills, et al. (2007) found that a significantly greater proportion of females tried to maintain or achieve their ideal weight than males (60% and 39%, respectively). A significantly greater proportion of females were aware of the amount and contents of food they consumed (79% for females and 38% for males), but a smaller proportion were physically active (33% for females and 86% for males). There were also distinct gender differences in perceived ideal weight in relation to perceived

current weight. Overall, females expressed a desire to lose an average of 4.2 kg, whereas males desired a weight gain of about 300 g. Fifty-nine percent of females with a BMI in the average range perceived themselves as "heavy," and only 31% correctly perceived themselves to be average. Among males with average BMI values, 43% perceived themselves correctly and 41% underestimated their actual heaviness. These studies demonstrate that young Japanese females in particular tend to perceive themselves as overweight even if their BMI is within the normal range. As this perception may in turn lead to disordered eating, there is a need for improved nutrition education and culturally-sensitive educational interventions to prevent body image problems (Sakamaki et al., 2005; Chisuwa & O'Dea, 2010).

Another factor which may affect individuals' diets is geographic proximity. Murakami, Sasaki, Takahashi, and Uenishi (2009) investigated the effect of neighborhood food store availability in relation to food intake in a sample of 990 female Japanese dietetic students 18-22 years of age. After adjusting for potential confounding factors, such as household socioeconomic status, geographic variables, and frequency of eating out, the researchers found that neighborhood store availability of confectionaries and bread was significantly positively associated with the intake of confectionaries and bread. No significant independent association was found for the other foods examined, including meat, fish, fruit and vegetables, and rice.

A third factor that may affect food behavior is nutritional knowledge or beliefs. Akamatsu, Maeda, Hagihara and Shirakawa (2005) investigated Japanese perceptions of what constitutes a healthy diet. In a questionnaire study of government office workers (n=1,115), Akamatsu et al. (2005) asked respondents to rate the importance of twenty

items to a healthy eating lifestyle. Of these, “eating a nutritionally balanced diet” and “eating plenty of vegetables” were perceived as the most important items for healthy eating, with more than half of the respondents rating each of these items as “extremely important” (5 on the scale). After excluding these two items, factor analysis was performed on the remaining items, extracting two common factors that were labeled as “eating style and habits” and “foods and nutrition in healthy eating.” Regarding the two main factors for healthy eating that were identified, Akamatsu et al. (2005) observed that the Japanese interpretation of “eating styles and habits” as a part of healthy eating differs from that of Western countries and argued that this difference is reflective of the traditional belief in eating styles and habits as an important part of health promotion. Following the factor analysis, Akamatsu et al. employed logistic regression to examine the demographic characteristics that might be related to the two factors. They found that being female, older, and more health-conscious was predictive of positive attitudes on both sub-factors; being on a diet and having nutritional counseling were additional factors that predicted high valuation of foods and nutrition in healthy eating.

Although researchers have approached the subject of food choice from a variety of perspectives, few studies have performed a multidimensional assessment of food motivations with a Japanese population. One such study was a cross-cultural comparison of Japanese and American college students by Hawks, Madanat, Merrill, Goudy and Miyagawa (2003). The instrument used, the Motivation for Eating Scale (MFES), was developed to facilitate comparisons of motivations for eating by nation and gender (Hawks et al., 2003). The 12-item MFES consists of three subscales: emotional, physical, and environmental motivations for eating. The emotional subscale consisted of items like: “I

feel depressed" and "I feel worried"; the physical included: "I have forgotten to eat and am starved" and "I am weak/lightheaded because I haven't eaten"; and the environmental motivations included: "I see something good at the checkout stand" and "I am at a social occasion or party." Hawks et al. (2003) administered the questionnaire to a convenience sample of 1,218 participants attending college in either the United States or Japan. No significant differences were found between the male students of the two countries. Among the female college students, American students were more likely to initiate eating for emotional reasons, and Japanese students were more likely to eat for physical or environmental reasons.

This review of the literature on the psychology of food choice in Japan encompassed three different facets: weight control, neighborhood availability and nutritional knowledge. The literature suggests that a variety of factors might influence the food choices of young Japanese, including social approval, a desire to maintain a certain weight, availability of particular foods, and beliefs about what constitutes healthy eating. There have been few studies that have performed multidimensional assessments of food choice with a Japanese population, but Hawks et al. (2003) found that Japanese female college students were more likely than their American counterparts to eat for physical or environmental reasons. The next section will discuss a multidimensional instrument for assessing food choice that has been employed in various countries, including Japan.

An Integrative Assessment of Food Behavior: The Food Choice Questionnaire

The development of the Food Choice Questionnaire. Although a great deal of literature exists concerning the factors involved in food choice, efforts to develop an instrument to assess the multidimensionality of food choice have been limited, and the

36-item Food Choice Questionnaire (FCQ) was designed to fill this need (Steptoe, Pollard, & Wardle,1995). The questionnaire consists of nine factors: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. Each factor, in turn, consists of several items such as "Is nutritious" (health), "Contains no additives" (natural content), and "Smells nice" (sensory appeal), which subjects rate on a 4-point scale (1 = not at all important, 2 = a little important, 3 = moderately important, and 4 = very important).

The Food Choice Questionnaire was developed and refined in two phases (Steptoe, Pollard & Wardle, 1995). In the first, a preliminary questionnaire consisting of 68 items was generated through a survey of the existing literature and consultation with nutritionists and health psychologists. This questionnaire was given to a sample of 358 subjects comprised of students, university library employees, and London residents. Factor analysis was performed, the scale was refined, and a 36-item questionnaire representing nine factors was developed (Steptoe, Pollard & Wardle, 1995).

In the second phase of their study, the 36-item FCQ was administered to a sample of 358 students and London residents to demonstrate its replicability. Confirmatory factor analysis demonstrated that the nine-factor model was a good fit. Test-retest reliability and internal consistency of the items was also demonstrated by examining correlations between the scores at the two administrations of the scale and Cronbach's α scores for each of the nine factors (Steptoe, Pollard & Wardle, 1995).

Research applying the Food Choice Questionnaire. Since the development of the Food Choice Questionnaire, it has been used by researchers in numerous countries. Some studies have employed the FCQ to compare the food choice motivations of different

nationalities, including the Japanese (Eertmans, Victoir, Notelaers, Vansant & Van den Bergh, 2006; Prescott, Young, O'Neill, Yau & Stevens, 2002). Others have administered the FCQ in conjunction with other scales to investigate the complex relationships among a number of variables determining food behavior (Eertmans et al., 2006; Sun, 2008). Kornelis, Herpen, Lans and Aramyan (2010) employed the FCQ in conjunction with other respondent information, particularly organizational membership, to identify consumer segments.

Various researchers (Ares & Gambaro, 2007; Fotopoulos, Krystallis, Vassallo, & Pagiaslis, 2009) have employed clustering techniques in conjunction with the FCQ to identify consumer segments that share commonalities in their food choice patterns. Using agglomerative hierarchical clustering on their sample of 200 Uruguayan consumers, Ares and Gambaro (2007) identified three clusters. Cluster 1, consisting of 75 individuals, was primarily composed of young people and men, and this group was mainly concerned with health and nutrient content as well as sensory appeal in the selection of their food. Cluster 2 consisted of 50 individuals and was composed of both men and women, with the majority living in households consisting of more than three people. These individuals valued health and nutrient content, natural content and sensory appeal most. Cluster 3 consisted of 75 individuals and was composed mainly of women. Sixty-eight percent of individuals living alone were also part of this cluster. This cluster gave high ratings to all factors, with price and convenience being the highest overall.

Fotopoulos et al. (2009) employed a two-step clustering procedure involving the use of hierarchical clustering, followed by k-means clustering using the centroids determined by hierarchical clustering. This procedure was performed for a varying number of clusters

(3-7), and the solutions were compared. The four-cluster solution was selected as optimal because it had the highest number of statistically significant food choice motives discriminating the clusters in pair-wised comparisons, and the highest correlation between the hierarchical and k-means cluster membership variables. The four clusters exhibited the following demographic tendencies: 1) consumers with an above-average education, who are better off, and living in areas far from urban centers; 2) "average" consumers with lower-than-average income; 3) consumers with a low education level, who were older, male, and less likely to be employed full-time; and 4) consumers who were younger, single, urban, with a lower-than-average education, and full-time employment. Each of these clusters evinced different tendencies in terms of their food selection motives.

Honkanen (2010) employed a revised version of the FCQ in conjunction with a food frequency questionnaire to identify Russian consumer segments with different food preferences (*n*=1,081). Factor analysis was performed on the responses to the food frequency questionnaire using principal components analysis with Varimax rotation. After removing the items that did not load on a single factor, there were 27 items representing six factors, which accounted for 57% of the variation. The six factors were: fish, cured fish, mixed, red meat, soup and white meat. The TwoStep Cluster function in SPSS 16, with log-likelihood as the distance function, was used to identify consumer segments with similar consumption patterns. Five different clusters were found: Fish Lovers, Fish Haters, Various Food Lovers, Food Indifferent and Red Meat Lovers. Univariate ANOVAs and cross-tabulations were then used to compare the clusters in terms of demographic characteristics, consumption patterns, food choice motivations, attitudes toward eating fish, and the perceived risk/benefit associated with fish consumption. The

version of the FCQ used by Honkanen was developed by Lindeman and Väänänen (2000) and consisted of 44 items which represented 12 different motivational factors: health, mood, convenience, sensory, natural price, weight, familiarity, availability, ecological, political and religious motives. Honkanen (2010) found differences between the clusters based on various demographic characteristics: age, city of residence, gender, education and income level. Honkanen observed that, though the differences in food choice motive scores for the various clusters were not large, most were statistically significant Price was not as important to Fish Lovers as it was to other groups, which reflects the higher income level of this group. Weight was also not an important consideration, perhaps because the group was comprised of a high proportion of males. Fish Haters scored the lowest on many factors including health. The Food Indifferent group was comprised mostly of females with a high education level but low income, and weight and price were important food choice motives for this group.

Statistical issues concerning the Food Choice Questionnaire. While a number of studies have used the FCQ, some (Eertmans et al., 2006; Fotopoulos et al., 2009) have reported low reliability as well as marginal fit to the original factorial structure proposed by Steptoe, Pollard, and Wardle (1995). Eertmans et al.'s (2006) study investigated the degree of measurement invariance of the FCQ across three western urban populations consisting of students in Canada, Belgium, and Italy. Confirmatory and exploratory factor analyses revealed a suboptimal fit for the nine-factor model in all samples, with small to considerable divergences from the original configurations. Eertmans et al. (2006) suggest three possible explanations for these results. First, the items may have acquired different connotative meanings in the translation process. Second, construct bias may have arisen

from incomplete coverage of all the representations of the construct of food choice. Third, divergence from the original FCQ nine-factor model may indicate that an evolution has occurred in the meanings attributed to food characteristics since the development of the FCQ in the mid-1990's. In particular, Eertmans et al. (2006) noted that there were several crises involving the European agricultural sector between 1995 and 2001 which received extensive media coverage, such as the BSE crisis (bovine spongiform encephalopathy, or "Mad Cow Disease").

Having noted the issues with the FCQ identified by Eertmans et al. (2006) and other researchers, Fotopoulos et al. (2008) set out to explore its deficiencies and create a more statistically robust instrument. Their data were gathered from a sample of 997 Greek households using a stratified sampling process that was nationally representative of education, geography, and income distribution. A Greek translation of the 36-item FCQ was used, and subjects were asked to rate the importance of the 36 items on a 7-point scale instead of the original 4-point scale employed by Steptoe, Pollard, and Wardle (1995). Confirmatory factor analyses indicated that the fit of the original 36-item FCQ was marginally acceptable. Factor loadings for most items were adequate; however, the loadings of a number of items were low, including a zero correlation for item 20 ("Comes from countries I approve of politically"). This item is part of the "ethical concern" dimension, which also showed low reliability (α=0.30). To improve the statistical properties of the factorial structure, Fotopoulos et al. (2008) excluded the "ethical concern" dimension, and discarded items with item-to-total correlations lower than 0.40, and items that did not load clearly on one factor. The resulting factorial structure included 24 items and showed improved goodness-of-fit and discriminant validity.

In a study of undergraduate students in Taiwan (*n*=491), Sun (2008) also found differences with the factor structure originally proposed by Steptoe et al. (1995). Though the original factor structure was largely preserved, one item was deleted from the scale based on Cronbach's α and the factor structure prior to deletion. In addition, the natural content and remaining ethical concern items comprised one factor rather than two distinct factors.

The previous discussion demonstrates that the ethical concern dimension of the FCQ may require revision to improve its statistical robustness. Though their work actually precedes the studies just discussed, Lindeman and Väänänen (2000) recognized three main problems with the ethical concern dimension. First, the three ethical concern items in the original FCQ did not necessarily represent a uniform construct, because some people might be concerned with environmental protection but be indifferent to politics. Second, the FCQ did not include a subscale for measuring food choice based on religious reasons. Lastly, Lindeman and Väänänen argued that, given the great increase in the number of vegetarians in recent years, there was a need for items concerning animal welfare to be included in the FCQ.

To address these issues, Lindeman and Väänänen (2000) developed three new scales: Ecological Welfare, Political Values and Religion. Altogether, the three new scales included 11 items. Though the five items that comprised the Ecological Welfare scale loaded onto a single factor, Lindeman and Väänänen noted that the reliabilities of the animal welfare and environmental protection items that comprised the scale were high enough for the two subscales to be used separately. The new scales were first developed

using a sample of 281 subjects, and the factor structure subsequently confirmed using a sample of 125 subjects.

Adapting the Food Choice Questionnaire to a Japanese population. The literature review revealed two previous uses of the Food Choice Questionnaire with a Japanese population (Prescott, Young, O'Neill, Yau & Stevens, 2001; Setoyama & Imada, 2005). Prescott et al. (2001) administered the FCQ to female consumers in Japan, Taiwan, Malaysia, and New Zealand. Taiwanese and (ethnically Chinese) Malaysian consumers rated health, natural content, weight control, and convenience as the most important food choice factors, but in different orders of preference. For Japanese consumers, the most important factors were price, natural content, health, and ethical concern, and for New Zealand consumers, sensory appeal, price, health, and convenience. The number of subjects, method of subject recruitment, and questionnaire administration were different for each country; only the aspects that pertain to the Japanese sample will be discussed here. The 165 subjects in the Japanese sample were approached in a suburban shopping area by staff from a market research company. For the questionnaire administration, they were seated at individual tables in a centrally located testing facility. Participants received booklets containing the questionnaire and instructions.

Although Prescott et al. (2001) make comparisons across cultures using the data they collected, there are aspects of the study that suggest further research may be necessary to confirm the generalizability of their findings to the Japanese female population. The first is the manner of subject recruitment. Prescott et al. (2001) stated that, since 75% of Japanese consume red meat, recruiting shoppers who are purchasing red meat is an acceptable method of recruiting a sample that could be generalized to the population as a

whole. Yet, though it may be that 75% of the population consumes red meat, they may not purchase their meat from the same types of locations. For example, those who shop for their families might buy raw meat in larger quantities to take home to prepare for their families, but those who are eating by themselves might customarily purchase already prepared food containing red meat, and purchase uncooked meat only rarely, if at all. Those who shop for prepared food may value convenience much more than those who shop for their families, who might be more concerned about price, since they need to make purchases for a larger number of people. Depending on the location of recruitment, it is possible that the sample could consist of mainly housewives or working women, and thereby serve as a source of subject bias.

The other issue of concern is the statistical robustness of the scale itself. Given that subsequent studies (Eertmans et al., 2005; Fotopoulos et al., 2008; Sun, 2008) have found issues with the ethical concern dimension and some other items in the FCQ, it is likely that there were also problems with the version of the FCQ that was administered in the Prescott et al. (2001) study. However, as reliability and results of confirmatory factor analyses were not reported in the study, it is unclear if those issues existed.

As part of their research for a Master's thesis, Setoyama and Imada (2005) administered the FCQ to a small sample of university students in Japan (n=69). Confirmatory factor analysis using Varimax rotation did not validate the original nine dimensions proposed by Steptoe, Pollard and Wardle (1995). Using a scree plot, it was determined that a three-factor solution provided the optimal fit for the data. Setoyama and Imada (2005) discarded the seven items which did not have significant loadings on any of the factors, as well as four items that had significant loadings on all three factors. Factor

analysis of the remaining 25 items then produced a three-factor solution that accounted for 49.49% of the total variance. The three factors found by Setoyama and Imada (2005) were composed of items reflecting: nature and health; convenience and cost; and mood and sensory appeal. Though it is possible that the original factor structure was not replicated due to the small sample size, additional effort to develop and validate a version of the FCQ for a Japanese population is warranted.

Thus, though the Food Choice Questionnaire might potentially be a useful instrument for assessing food choice within a population, previous research findings suggest key issues to consider. As observed by Eertmans et al. (2006), there is the possibility that certain items on the scale may acquire different connotative meanings in translation. Although both Eertmans et al. (2006) and Fotopoulos et al. (2008) translated and back-translated their surveys to ensure the comparability of the questionnaires to the original English FCQ, the reliability and factor loadings for various items still differed from those obtained by Steptoe, Pollard, and Wardle (1995). Given these results, there are perhaps two avenues to consider: to discard the items altogether, as Fotopoulos et al. (2008) proceeded to do; or to attempt to re-phrase the item in a way that embodies a connotative meaning equivalent to the original English meaning (which may not be possible if there are underlying differences in certain cultural constructs).

Although important in any translation, construction of a Japanese version of the FCQ would necessitate that great care be taken that items are not merely translated accurately, but, as phrased by Eertmans et al. (2006), equivalent in "connotative meaning." In examining the FCQ, it is apparent that wording is quite concise and generic. When it comes to questionnaire administration, this may be a positive attribute in that subjects are

less likely to become confused by the wording. However, as a base for translation, one can easily imagine a particular phrase being translated any number of different ways, with certain ways being more appropriate than others for expressing the intended construct.

In addition to differential connotative meaning, the other two sources of construct bias suggested by Eertmans et al. (2006), incomplete representation of all food choice motives and evolution in the meanings of food characteristics, would also be concerns in administering this questionnaire to a Japanese population. Given that the Food Choice Questionnaire was originally developed for populations in the United Kingdom, it is possible that dimensions of food choice exist in Japan which are not represented in the questionnaire. A qualitative study involving semi-structured interviews would perhaps be helpful for exploring this issue. Qualitative research could also be used to validate the dimensions that are currently included. The "ethical concern" dimension, consisting of "Comes from countries I approve of politically," "Has the country of origin clearly marked," and "Is packaged in an environmentally friendly way," seems particularly problematic, and as previously mentioned, has actually been found to be so in past studies (Eertmans et al., 2006; Fotopoulos et al., 2008). With regard to evolution of food-related meanings, Eertmans et al. (2006) suggested that media coverage of the BSE crisis may have changed attitudes toward food in Europe; a similar possibility exists in the case of Japan due to heightened concern in recent years of food poisoning resulting from Chinese agricultural imports. These are all issues suggesting that it would be beneficial to conduct preliminary research as a basis for modification of the Food Choice Questionnaire for use with a Japanese population.

As can be seen, though researchers in Japan have investigated the influence of certain factors on food choice, a measure that assesses the variety of possible influences is lacking. The Food Choice Questionnaire developed by Steptoe, Pollard and Wardle (1995) offers great potential as an instrument for assessing the multidimensionality of food choice. However, results of previous studies suggest that, before administering the scale to a new population, it would be useful to explore the relevance of the current dimensions of the scale, the possible existence of dimensions not encapsulated in the current instrument, and the proper phrasing to express the meaning of each scale item. Thus, this study proposes a two-stage process for adaptation of the FCQ to a Japanese population: the use of a limited number of semi-structured interviews to explore the issues previously discussed, followed by administration of a revised FCQ (based on the results of the interviews) to a larger sample.

Aside from extending our knowledge of the processes that determine food behaviors, nutritionists and policymakers can use the FCQ as a tool for investigating the food motivations of various population subgroups and communities, and it can ultimately serve as a reference for the development of interventions targeting these groups. The food and restaurant industries might also employ the FCQ to draw connections between certain food motivations, demographic variables, and media consumption habits, thus facilitating the selection of appropriate media channels for marketing campaigns targeting specific segments of the population.

Connecting Food and Health Information Behaviors

The next section will offer an overview of the extant literature concerning health information behaviors and food choice, first by providing a relevant conceptual model,

continuing with a review of research concerning media influences on food behavior, and concluding with a discussion of selected literature concerning health information use. Adachi (2008) developed a conceptual model, "Food and Dynamics in the Community," which depicted individuals as subjects in a complex system in which they may be influenced by a wide variety of natural, social and cultural conditions. Though her model was developed from a case study of school children, this author believes that the model could be applied to populations of other ages. The major information-transmission settings included: personal information from families, neighbors and friends, afterschool programs, sports clubs, tutoring schools, health centers, hospitals, educational institutions, and mass media information from television, newspapers, magazines and the Internet. In this study, the model will serve as a framework to study a variety of influences on food behaviors: families, friends, health care professionals/settings and mass media.

In order to gain an overall picture of children's meal circumstances, including not just food and nutrient intake, but also emotions and human relationships, Adachi (2008) employed a meal picture drawing exercise. She asked them: "How was your breakfast this morning (or your dinner last night)? Please draw a picture of the mealtime including foods you consumed and the people you ate with." The study was conducted with 2,067 school children from seven regions in Japan. The drawings enabled Adachi to identify the combination of dishes in the meal, time of the meal, family members at the meal and mealtime environment.

Self-administered questionnaires were also used to examine the frequency of eating meals with family, involvement in meal preparation, views and attitudes towards meals, and health status. Adachi (2008) found that children who ate alone that day were more

likely to eat meals alone regularly and eat less-balanced meals. They were also less likely to report having an appetite before meals, enjoy eating meals, eating breakfast, being involved in meal preparation and being healthy. Thus the meal picture was an effective method for the researchers to develop a comprehensive picture of food and nutrition dynamics for each child.

This study by Adachi (2008) illustrated the important role that family may play in the conceptual model of food and nutrition dynamics. Other researchers have studied how media influences the Japanese public's perceptions about food safety and their willingness to purchase food products. The BSE crisis in 2001 and incidents of food poisoning through gyoza (also called "potstickers," gyoza are pork and vegetable-stuffed dumplings) imported from China in 2008 are two cases in recent history which have had substantial influence on the Japanese public's perceptions of food products. Clemens (2003) observed that, following the BSE crisis, both demand for domestic and imported beef fell, but the market for domestic beef recovered more quickly than that for imported beef. As of 2003 when her report was published, Clemens reported that imports of beef, pork and poultry had returned to levels that were comparable to those prior to the BSE crisis, but that the food industry continued to contend with the loss of consumer trust and confidence.

Rosenberger (2009) analyzed the Japanese reaction to incidents of food poisoning from frozen gyoza imported from China. Following the incidents of food poisoning which occurred in early 2008, the media encouraged the public to buy domestically-produced ("kokusan") foods. Though content analysis of media coverage was the basis of her work, she also supplemented this material with conversations she had with Japanese consumers. Rosenberg observed: "Consumers I talked with showed disgust

towards foods from China and affectionate appetite towards Japan-grown foods" (Rosenberg, 2008, p. 245). However, she also noted that, in actuality, purchasing only Japanese products was economically infeasible given the high prices of domestic goods. Thus, her account demonstrated conflicting motivations at work in consumers' food choice decisions. On the one hand, they wanted to buy Japanese products because they believed them to be of higher quality, but on the other, they were also constrained by the limits of their pocketbooks. Though young people were not the focus of Rosenberg's article, she also cited literature that argued that, because young people had acquired a taste for a more Western diet of bread and meat, they had lost the taste for milder, more natural Japanese foods, and that they were in the habit of buying snacks and ready-made or frozen foods from convenience and grocery stores, thus maintaining the market for Chinese frozen foods.

The preceding discussion illustrates that there have been a number of studies that have examined the effects of various information sources on the food choices of the Japanese. However, research that attempts to compare the extents of their influences has been limited. One cohort study of middle-aged Japanese men assessed changes in their health practices over a three-year period and also examined the associations that might exist between their health practices and factors such as health values, health information seeking behaviors, socioeconomic characteristics, and health status (Shi, Nakamura & Takano, 2009). This study considered ten kinds of health information delivery channels and information-seeking activities: 1) reading newspapers and magazines; 2) attending health lectures; 3) watching television; 4) engaging in volunteer work; 5) participating in community health promotion programs; 6) subscribing to health magazines; 7) consulting

with doctors about healthcare; 8) taking into account the health benefits of the products they purchase; 9) taking vitamin supplements or health drinks; and 10) buying books on healthcare. Subjects were asked to evaluate how well each item applied to their acquisition or accessing of health-related information in daily life using a four-point Likert-type scale. Of these, items 1, 3, 5, 6, 7 and 10 showed a tendency for linear correlation with the Health Practice Index (HPI), an eight item scale that was developed to reflect an individual's general health practices. Four of the eight items that comprised the HPI were directly related to diet and nutrition: "eats breakfast, lunch and dinner regularly," "has a balanced diet," "avoids excessive salt intake," and "stops eating when 80% full." These results suggest that the following information-seeking activities, such as watching television programs on medicine and health, consulting with doctors for self-health management, reading and buying books on health or medicine, and participating in health promotion activities in the community, may be associated with health practices.

Though not included as an information source in the study by Shi, Nakamura and Takano (2009), use of the Internet has grown rapidly in Japan in the last decade. Comparing the results of two cross-sectional surveys in 2001 and in 2006, researchers at NHK Broadcasting Culture Research Institute found that Internet use, measured in terms of time, virtually doubled in those five years (Nakano & Watanabe, 2006). Internet access by mobile phone has also become very common. According to the Ministry of Internal Affairs and Communications (2009), in the year 2008, 73.9% of those between the ages of 13 and 19 accessed the Internet through mobile phones. Among those between 20 and 29 years of age, this percentage was even higher, at 86.8%.

A survey employing stratified, multi-stage random sampling (*n*=1,200) found that 23.8% of respondents indicated that they had used personal computers to obtain health-related information within the past year (Takahashi, Ohura, Okamoto, Miki, Naito, Akamatsu et al., 2009). The use of mobile phones to obtain health-related information was much less common, at 6.4%. These figures suggest that, although the Internet does play a role in the health information seeking behaviors of Japanese, other more traditional information sources continue to play a role.

Fukunaga and Satomura (2005) conducted a questionnaire study (*n*=1,393) to investigate the environment and conditions for the provision of health care services over the Internet. Though they collected data from three types of respondents – the general public, physicians and health website operators – only the data regarding the public's Internet search patterns are to be reviewed here. Fukunaga and Satomura found that only 46.4% (*n*=576) had prior experience using the Internet. Regarding how much they relied on the Internet for obtaining health care information, 56.9% responded "never," and 21.1% responded "2-3 times a year." When asked about the reliability of healthcare information available on the Internet (*n*=1,140), 53.6% responded "neither safe nor unsafe", 37.1% indicated that it was "reliable," and 9.7% said that it was "not reliable." Those who had prior experience using the Internet were more likely to indicate that health information available on the Internet was reliable.

Before bringing this review of health information sources to a close, it may be worthwhile to mention participation in online social networking sites (SNSes) as an information behavior that might also influence young people. Takahashi (2008) observed that in recent years, SNSes have also become embedded in the lives of young Japanese. In

an ethnographic study of young people living in Tokyo which involved group and in-depth individual interviews, participant observations and a survey of 324 college students, she found that the most important aspect of information behavior with regard to SNSes is information sharing. The most common function utilized by students was the diary function; 97.8% of Mixi[1] users accessed Mixi to read diaries written by someone else. Takahashi cited an example of one of the users she interviewed, in which the user said that he frequently accessed the blogs of his peers through his mobile phone. It was expected that one would read and comment frequently on the blogs of one's in-group, or "uchi." Thus, Takahashi concluded, use of Mixi to seek information was ritual as well as instrumental, a natural part of an individual's daily rhythm, and something that contributed to the creation of their daily life: "Mixi was "about 'me' who is embedded and in the multiple *uchis* and create and recreate their identities through their complex connectivity with information, images, people, social groups and communities on SNS" (Takahashi, 2008, p. 35). SNSes have become a venue in which young people become embedded in multiple contexts, particularly of their peers, and in that sense, may play an important role in various aspects of their behavior, including health.

Summary

The preceding literature review began with a discussion of the existing literature concerning food choice motivations such as body image, geographic proximity and health concern, which was followed by a review of an integrated, multidimensional assessment of food choice motivations, the Food Choice Questionnaire. The third part of the literature review provided an overview of the literature concerning health information use and food

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[1] Mixi (http://mixi.jp) is the most popular SNS in Japan, and currently ranked tenth overall in Japan ("Mixi.jp," 2010).

behaviors, with particular attention to a Japanese context. The limited amount of data available as well as the rapid growth and proliferation of the Internet in the country in recent years, warrants more research concerning the channels that Japanese use to obtain health information. Thus, the current study will investigate the food choice motivations of Japanese university students and the relationship of these motivations with eating habits, health information seeking behaviors, and demographic variables such as age and gender.

Method

The data collection phase of this study consisted of two parts. In the first part, ten semi-structured interviews were conducted with students from a university in Tokyo, Japan, to serve as a basis for modifying a questionnaire consisting of four sections: food choice motivations, eating habits, health information use and demographics. In the second phase, the modified questionnaire was administered to voluntary participants in a classroom setting at the same university in Tokyo. In the data analysis phase, factor analysis of the FCQ was performed, followed by cluster analysis to identify subgroups that shared common food choice motivations. Lastly, Chi-square tests and analyses of variance (ANOVA) were used to compare the subgroups based on personal characteristics, eating habits and information use.

Data Collection

Part 1 of the study was conducted in December 2009 and consisted of ten semi-structured interviews. The interviews were approximately one hour in duration and consisted of questions about food choice, eating habits, and health information use (Appendix A). Interviewees were recruited from a class at a university located in Tokyo, Japan. A description of the study was posted on the class website, asking interested students to contact the investigator via email. The investigator then arranged a time with the interviewee and conducted the interview face-to-face at a private location at the university, after obtaining informed consent (Appendix B). The interviews were

conducted in Japanese. At the conclusion of the interview, the participant received 1,000 yen (roughly the equivalent of US$11) as compensation for their time.

In part 2 of the study, a questionnaire was administered in two classes at the same university as in part 1 of the study. The survey was administered in mid-January, 2010. The students were given 20 minutes in class to complete the questionnaires. The students were informed by their instructor that their participation was voluntary, and should they choose not to participate, they could leave the survey blank and submit it along with students who completed it. The survey included a fact sheet (Appendix C) that described the study and explained that filling out the questionnaire implied consent.

The survey was administered to a total of 143 students. Twenty-one questionnaires were returned blank and three completed questionnaires were excluded from the analysis because the content of the responses suggested that the respondents were not Japanese. Of the remaining 119 questionnaires, two were automatically excluded from the analysis because a large number of items from the first section, the Food Choice Questionnaire, had been left blank. The remaining 117 questionnaires were used as the basis for all subsequent analyses. Thus, a final response rate of 83.6% was achieved in the survey distribution (this percentage was calculated based on the total number of questionnaires distributed, excluding the three complete responses from non-Japanese respondents).

Of the questionnaires that were used in the subsequent analyses, six were missing a limited number of values in the Food Choice Questionnaire section. After using Little's MCAR ("Missing Completely at Random") test in SPSS to confirm that the values were missing at random, regression was used to generate estimates for those missing values so that all available data could be used. There were a limited number of missing values (at

most three) among the other variables necessary for subsequent analyses; in such cases the Chi-square tests and ANOVAs were performed with unequal sample sizes.

Survey Instrument

The questionnaire administered in part 2 of the data collection phase (Appendix D) consisted of four sections: a revised Food Choice Questionnaire, dietary habits, health information use, and personal characteristics. The Food Choice Questionnaire developed by Steptoe, Pollard and Wardle (1995) served as the basis for the first part of the questionnaire. The first 36 items in the questionnaire were used in the same order as they appeared in the original FCQ (Appendix D, items 1-36 of Question 1).

As mentioned in the literature review, previous researchers had suggested that connotative differences in different linguistic versions of the FCQ or incomplete representation of the dimensions of food choice in the questionnaire could have detracted from its statistical properties. Thus, the preliminary interviews were used to determine if there are motivations for food choice that did not appear in the original FCQ. Various themes emerged, and these were added to the questionnaire as items 37-40. The interviews were also used to ensure that the language of the questionnaire was familiar to the target population. Following the interviews, the investigator also worked with other Japanese to phrase the items that appear on the FCQ using language that the interviewees would find natural.

The eating habits section (Appendix D, Questions 2-9) asked respondents various questions regarding their dietary habits: frequency of meals, snacks, breakfast, fruit and vegetable consumption, eating with others, diet experience, and a desire to change their

current dietary habits. This section was adapted from the questionnaire employed by Sakamaki et al. (2005).

The health information use section (Appendix D, Questions 10-13) asked respondents about their usage and trust of various information sources, as well as previous experience searching for health information. Item 10 asked the respondent to rate the importance of ten health information sources: internet (via personal computers); internet (via mobile phones); television; magazines; newspapers; books; practitioners of Western medicine; acupuncturists, massage therapists, herbalists and other practitioners of alternative medicine; family; friends; and other. Item 11 asked the respondents to rate the extent to which they trusted these information sources. Item 12 asked the respondents to share the health- and nutrition-related topics that they had previously searched for, as well as the resources they had used to find this information.

Two aspects of this information use section deserve particular attention. First, as both the literature review and interview content revealed that students accessed a great deal of online content through their mobile phones, this section of the questionnaire asked the respondents to differentiate between the use of personal computers and mobile phones in their use of the Internet. Second, alternative medical practitioners were listed as a separate item apart from Western medical practitioners. Utilization of alternative medicine is quite common in Japan. Yamashita, Tsukayama and Sugishita (2002) found that its rate of utilization was greater than that of Western medicine (76.0% as opposed to 65.6%) in a nationwide telephone survey using random sampling and population weighting (n=1,000). Furthermore, the circumstances under which it is used often differ from those in which Western medicine is used. When asked about their use of Complementary and Alternative

Medicine (CAM), 60.4% responded that the “condition was not serious enough to warrant orthodox Western medicine” and 49.3% were “expecting health promotion or disease prevention” (Yamashita, Tsukayama & Sugishita, 2002). As individuals are likely to obtain different kinds of health-related advice from Western and alternative practitioners, they were listed as separate information sources.

The demographics section (Appendix D, Questions 13-22) was used to gather personal information about the participants, including sex, age, height, weight, duration of residence in Japan, countries of residence other than Japan, employment status, frequency of exercise, whether they cooked at home, living situation (living alone, in a dormitory, with friends, with parents, with siblings, with a spouse, with family members other than those previously mentioned, and other), and overall concern with health and nutrition. The interview content suggested that co-habitation with different family members had different effects on individuals. For example, those who lived with siblings but not their parents tended to rely on each other more and perhaps take care of the other sibling; however, this was not the case for those who lived with parents as well as siblings. Thus, the different familial relationships were distinguished in the responses for this question, and respondents were asked to select all applicable responses.

The height and weight of the respondents were used to calculate their BMI. A person’s BMI is calculated by taking their weight in kilograms and dividing by the square of their height in meters. BMI has been shown to be directly related to health risks and mortality rates in many populations (WHO expert consultation, 2004). There has been some debate whether different cutoff points should be established for Asian populations. A WHO expert consultation reviewed the extant literature and concluded that a

proportion of Asian people are at high risk for type 2 diabetes and cardiovascular disease at BMIs substantially lower than the current WHO cutoff for overweight, 25 k/m^2. However, as the available data did not indicate a clear cutoff point for all Asian populations, the consultation agreed that the WHO BMI cutoff points should be retained as the international classification.

The questionnaire was translated from the original English version by the author, who has professional experience as a translator between English and Japanese, and then revised by a Japanese with native-level fluency. The questionnaire was then back-translated for accuracy by a Japanese language instructor with native-level fluency of Japanese and professional translation experience. After modifications had been made on the basis of the interviews, the questionnaire was pilot-tested with twelve individuals of varying ages. Following the pilot tests, changes were made to the multiple choice responses to Question 2, concerning the number of times people snacked a day (the addition of "almost never" as a possible response, deletion of "four times," and change of "three times" to "three or more times"), and the logic flow for Questions 12, 21 and 22 (to account for the possibility that respondents have never performed health-related searches, and never lived abroad).

Data Analysis

Factor analysis. As the literature review has shown, factor analysis has previously been used for the extraction and confirmation of the factors in the FCQ. Factor analysis is often used for theory and instrument development, assessment of the construct validity of an instrument, and identification of external variables, such as gender and age, which may be related to the dimensions of the construct being studied (Pett, Lackey, & Sullivan, 2003). Its particular strengths include the ability to reduce a larger number of predictors to a

smaller number of predictors, to help researchers decide how many latent variables are necessary to understand the responses to test items, and to assist in the development of multi-item scales (Warner, 2008).

There are two basic types of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The former is often used by researchers to explore the underlying dimensions of a construct when they do not know in advance how many factors would best explain the inter-relationships among a set of characteristics, indicators, or items (Pett, Lackey & Sullivan, 2003), and the latter is used to evaluate how well a hypothesized set of identified factors fits the data (Nunnally & Bernstein, 1994). As the questionnaire was modified following the interviews, the current study used PASW Statistics 18 to perform exploratory factor analysis. The principal axis factoring method was used to analyze the communal variance between variables (Tabachnick & Fidell, 2007). Oblique rotation (Promax, Kappa equal to 4) with Kaiser criterion (eigenvalues greater than or equal to one) was used for factor extraction. With regard to the decision of using orthogonal or oblique rotations, Tabachnick and Fidell wrote: “Orthogonal solutions offer ease of interpreting, describing, and reporting results; yet they strain ‘reality’ unless the researcher is convinced that underlying processes are almost independent” (p. 638). As the various dimensions of food choice were likely to be correlated, oblique rotation was performed.

Based on the results of the factor analysis, factor scores were calculated for each respondent. There are two main classes of factor score computation methods: non-refined and refined (DiStefano, Zhu & Mîndrilă, 2009). Non-refined methods include: summing scores by factor, summing scores above a cutoff value, summing standardized

variables, and weighted sum of scores. One of the simplest methods for calculating factor scores is to sum the raw scores for the items that comprise each factor. Average scores can be calculated to retain the scale metric, which facilitates easy interpretation. However, this approach assumes that all items on a factor have an equal weight, regardless of their loading value.

SPSS offers three different methods for calculating refined factor scores: regression, Bartlett and Anderson-Rubin. The regression approach results in the highest correlations between factors and factor scores (Tabachnick & Fidell, 2007). When the regression method is used with principal components analysis, the distribution of each factor's scores has a mean of zero and a standard deviation of 1. In the case of principal axis factoring, the factor extraction method employed in this study, the standard deviation is the squared multiple correlation between factors and variables, also known as the communality estimate (Tabachnick & Fidell, 2007; DiStefano, Zhu & Mîndrilă, 2009). In the regression method for calculating factor scores, the standardized observed values of the items in the estimated factors are weighted by regression coefficients, which are obtained by multiplying the inverse of the observed variable correlation matrix by the matrix of factor loadings, or in the case of oblique factors, the factor correlation matrix. The Bartlett method produces factor scores that correlate only with their own factors and the factors are unbiased; however, factor scores may still be correlated with each other. The Anderson-Rubin method produces factor scores that are uncorrelated with each other even if factors themselves are correlated. Tabachnick and Fidell recommended using the Anderson-Rubin method if one needs uncorrelated scores, and the regression method otherwise, because it is the best understood and most widely available.

One advantage of non-refined scores is that they are thought to be more stable across samples than refined methods (DiStefano, Zhu & Mîndrilă, 2009). However, the factor scores may not accurately reproduce the relationships among factors. Thus, in this study, sample means were calculated according to the average score method to facilitate comparison with previous studies employing the FCQ. Regression factor scores were employed in the cluster analysis for three reasons: to render a more accurate representation of the relationships among factors; to reduce the effect of bias from the scale metric; and to reduce the effect of outliers using standardized variables, as discussed in Kaufman and Rousseeuw (1990).

Cluster analysis. The regression factor scores generated for each subject were used in a cluster analysis to identify distinct clusters of students that shared similar patterns of food choice motivations. A number of studies from the literature review performed cluster analysis on factor scores and then used post-hoc analyses to explore differences between clusters (Ares & Gambaro, 2007; Fotopoulos et al., 2009; Honkanen, 2010). These studies employed two primary types of cluster analysis: hierarchical and partitional. Hierarchical clustering produces nested clusters that can be depicted as a tree, whereas partitional clustering methods such as k-means produce non-overlapping subsets, or un-nested clusters (Tan, 2006).

Hierarchical clustering techniques can further be divided into two types: agglomerative and divisive. One strength of agglomerative hierarchical clustering is that the hierarchy that it produces can be used in the creation of a taxonomy; studies have also argued that it produces better-quality clusters (Tan, 2006). However, in agglomerative hierarchical clustering, once a data point is assigned to a cluster, it cannot be reassigned.

This can be a problem with noisy, high-dimensional data, such as document data. Agglomerative hierarchical clustering methods are also expensive in terms of both their computational and storage requirements.

The strengths of the k-means clustering method include that it is simple, efficient and can be used with a wide variety of data types. However, the number of centroids must also be specified in advance, and its outcome is highly dependent on the initial selection of centroids and instance order (Peña, Lozano, & Larrañaga, 1999). The k-means clustering method also has difficulty clustering data containing outliers (Tan, 2006).

Given the relatively small number of cases to be clustered in this dataset, it was suitable to perform hierarchical cluster analysis. There are a variety of different hierarchical clustering methods, and given the differences in their algorithms, they are likely to produce very different results with the same data. In this case, Ward's and average link within-groups were initially considered as candidate algorithms with the aim of minimizing within-cluster variability. Ward's method is designed to minimize the variance within clusters in any given step (Borgen & Barnett, 1987). At each stage, the algorithm merges the two clusters that, once merged, would result in the lowest increase in the within-groups sum of squares, or error sum of squares. One drawback to Ward's algorithm is that it tends to form spherical clusters, even if this structure is not inherent to the clusters; thus it may not be the most suitable method for situations where natural clusters are elongated or oddly-shaped. Thus, the average link within-groups method was ultimately utilized in this analysis. Average link within-groups is a variation of the average link between-groups method, also called unweighted pair-group method using arithmetic averages (UPGMA; Norusis, 2008). Whereas UPGMA considers the average

distance between all pairs of points between clusters, average link within-groups combines clusters so that the average distance within clusters is as small as possible. Cluster analyses using both methods were performed using squared Euclidean distance as the distance measure.

The question of how to determine the optimal number of clusters is one that has been discussed extensively by previous researchers. Milligan and Cooper (1985) conducted a Monte Carlo evaluation of 30 procedures for determining the correct number of clusters. Rapkin and Luke (1993) enumerated various methods that are often used in community research. These included: the inverse scree plot, the number of cases within the cluster, significant one-way ANOVA effects on profile variables, pooled within-cluster correlation matrix, tests of multivariate effects, stability of solutions and interpretability. Use of the agglomeration schedule is another technique that is often used (Burns & Burns, 2008; Bergman, 2003). The point that is usually selected is that with the greatest change in the distance coefficient.

It is perhaps important to note here that Bergman (2003) argued that there are no definitive rules for generating a logical cut-off point in cluster analysis, though there are procedures and recommendations. In hierarchical cluster analysis, the decision about the number of clusters one might move up or down the hierarchy depends on the level of detail that is most useful in the specific case. In this study, the optimal number of clusters was determined based on the agglomeration schedule and interpretability of factors. In this case, the agglomeration schedule (Appendix I) indicated that the greatest increase in the distance coefficient, 2.08, occurred in the next to the last step. However, even between the 110^{th} and 115^{th} iterations, the difference between steps largely remains above 0.6, while the

differences in prior iterations are considerably smaller. Thus, two- to seven- cluster solutions were considered as candidate cut-off points, and the five-cluster solution was ultimately selected as the level of detail that was most useful for interpretation.

Post-hoc analyses. Once the five-cluster solution had been determined, Chi-square tests and univariate ANOVAs were employed to determine if the clusters based on food choice motivations differed significantly in terms of personal characteristics, eating habits and information use. Chi-square tests were used to determine if there were differences in the frequencies among the categorical variables (i.e., demographic and eating habit variables). As many of the expected cell sizes in the Chi-square analyses were less than five, the SPSS Exact Tests module was used to calculate an exact *p* value instead of an asymptotic *p* value (Mehta & Patel, 1996). In cases where it was not possible to calculate an *exact p* for computational reasons, the Monte Carlo method using 10,000 random samples and a starting seed of 2,000,000 was used to calculate the exact *p* value. In addition to calculating exact *p* values, the SPSS Exact Tests module can also be used to perform Fisher's Exact Test for R x C contingency tables. For comparative purposes, this study has reported exact *p* values calculated using both Pearson Chi-square and Fisher's Exact Test.

Univariate ANOVAs were used to determine if there were significant differences in the means for information use and trust, and in levels of health concern, among the clusters. Post-hoc pairwise comparisons were performed with the Games-Howell test to take into account unequal variances and sample sizes (Games, Keselman & Rogan, 1981).

Results

Descriptive Statistics

The two most salient characteristics of the sample were that 86% (n=98) of the participants had lived abroad, and 82% (n=95) were female (Table 1). The mean number of years of residence overseas was 6.8 (SD=5.37). As these were generally characteristic of the student body from which the two classes were selected, these percentages were not surprising.

The mean age of the sample was 20.57 (SD=1.47) years. A high percentage (72%; n=82) of the students worked part-time. The mean numbers of hours worked per week was 9.8 (SD=6.1). Almost all (n=111; 97%) of the participants indicated that they considered their health at least somewhat important, with 25% (n=29) giving it a rating of 3 out of 5, 49% (n=56) giving it a rating of 4, and 23% (n=26), a rating of 5. The students were fairly evenly divided between those who cooked (48%) and those who did not (52%). Though a percentage (39%) of students exercised regularly, most did not (61%). Among those who did exercise regularly, the mean number of hours per week was 5.8 (SD=4.36). The average BMI of the male students was 20.87 (*n*=21, SD=2.20), and the average BMI of the female students was 19.75 (*n*=75, SD=1.87). Students were also asked to indicate the degree to which they were concerned about health and nutrition on a scale of 1 to 5, with 1 being “not at all,” and 5 being “a great deal.”

Table 1

Personal Characteristics

		n	%
Gender	Male	21	18.1
	Female	95	81.9
	Total	116	
Part-time employment	Yes	82	71.9
	No	32	28.1
	Total	114	
Exercises	Yes	44	38.6
	No	70	61.4
	Total	114	
Cooks at home	Yes	56	48.3
	No	60	51.7
	Total	116	
Overseas Experience	Yes	98	86.0
	No	16	14.0
	Total	116	
Health Concern	1 not at all	0	0
	2	4	3.5
	3	29	25.2
	4	56	48.7
	5 a great deal	26	22.6
	Total	115	

Item 22 was a multiple-choice question regarding students' living situations. Students were asked to check all options that applied, and altogether, 109 students responded (Table 2). Approximately two-thirds of these individuals (*n*=72) lived with their parents. About a third lived with siblings (*n*=37); almost all of these individuals also lived with their parents. There was also a limited number of individuals who lived with other family, friends, and in dormitories. Twenty-two percent of the sample (*n*=24) lived by themselves.

Table 2

Living Situation

Living Situation	Yes		No	
	n	%	*n*	%
Lives with parents	72	66.1	37	33.9
Lives with siblings	37	33.9	72	66.1
Lives with other family	6	5.5	103	94.5
Lives with others	7	6.4	102	93.6
Lives alone	24	22.0	85	78.0
Lives in a dormitory	3	2.8	106	97.3

Food choice motivations. Taking an initial look at the Food Choice Questionnaire, item 4 “Tastes good” elicited the highest mean: 4.71 (Table 3). Other items with means above four were items 29 “Keeps me healthy” (4.37); 37 “Includes a lot of vegetables” (4.15); 12 “Is good value for the money” (4.13); 13 “Cheers me up” (4.05) and 36 “Is cheap” (4.02). The items with the lowest means were items 34 “Helps me cope with life” (2.89); 19 “Is packaged in an environmentally friendly way” (2.76) and 20 “Comes from countries I approve of politically” (2.42).

Table 3

Food Choice Questionnaire: Descriptive Statistics

No.	Item	Mean	SD
1	Is easy to prepare	3.74	.976
2	Contains no additives	3.24	1.031
3	Is low in calories	3.41	1.076
4	Tastes good	4.71	.743
5	Contains natural ingredients	3.62	.899
6	Is not expensive	3.93	.935
7	Is low in fat	3.29	1.115
8	Is familiar	3.36	1.044
9	Is high in fiber and roughage	3.39	1.067
10	Is nutritious	3.96	.974

No.	Item	Mean	SD
11	Is easily available in shops and supermarkets	3.93	.888
12	Is good value for the money	4.13	.794
13	Cheers me up	4.05	1.007
14	Smells nice	3.71	1.001
15	Can be cooked very simply	3.74	.939
16	Helps me cope with stress	3.49	1.047
17	Helps me control my weight	3.42	1.131
18	Has a pleasant texture	3.58	.949
19	Is packaged in an environmentally friendly way	2.76	1.053
20	Comes from countries I approve of politically	2.42	1.169
21	Is like the food I ate when I was a child	3.16	1.122
22	Contains a lot of vitamins and minerals	3.95	.927
23	Contains no artificial ingredients	3.50	.935
24	Keeps me awake/alert	2.54	1.046
25	Looks nice	3.53	.988
26	Helps me relax	3.42	1.061
27	Is high in protein	3.28	.990
28	Takes no time to prepare	3.85	.912
29	Keeps me healthy	4.37	.772
30	Is good for my skin/teeth/hair/nails etc.	3.72	.999
31	Makes me feel good	3.87	.943
32	Has the country of origin clearly marked	3.51	1.142
33	Is what I usually eat	3.62	1.006
34	Helps me cope with life	2.89	1.175
35	Can be bought in shops close to where I live or work	3.82	.935
36	Is cheap	4.02	.871
37	Includes a lot of vegetables	4.15	.826
38	Consists of many dishes	3.89	.904
39	Keeps me full	3.96	.800
40	Consists of colors that look good together	3.59	.948

The absolute value of the skewness and kurtosis of all variables except item 4 were lower than or quite close to |1|. Item 4 had a skewness of -3.57 and kurtosis of 14.46. The skewness and kurtosis of all FCQ items can be found in Appendix F.

Dietary habits. With regard to the frequency of meals and habit of eating breakfast, 78% of students had three meals a day, but only 60% had breakfast daily (Table 4). About half of the students snacked about once a day, although there was a percentage that snacked more often. Forty-four percent had vegetables twice a day and 19 percent, three times or more. About half of the sample had fruit once a day; 17% had fruit twice a day. Twenty-seven percent of the sample shared meals three or four times a week with others, and a little over half of the sample shared meals five times a week with others. The students also expressed a desire to change their eating habits, both in the present and in the past. About two-thirds (66%; *n*=76) of the students had previous dieting experience, and a little over half (53%; *n*=62) had a desire to change their current habits.

Table 4

Eating Habits

Item		*n*	%
Meals per day	One time	2	1.7
	Two times	24	20.7
	Three times	81	69.8
	Four or more times	9	7.8
	Total	116	
Snacks per day	Almost never	16	13.8
	One time	55	47.4
	Two times	31	26.7
	Three or more times	12	12.1
	Total	114	
Breakfast	Rarely	12	10.3
	1-2 times/wk.	11	9.5
	3-4 times/wk.	23	19.8
	Daily	70	60.3
	Total	116	
Vegetable Consumption	Less often than once a day	6	5.2
	Once a day	36	31.3

Item		*n*	%
	Twice a day	51	44.4
	3 or more times a day	22	19.1
	Total	115	
Fruit Consumption	Less often than once a day	3	32.2
	Once a day	57	49.6
	Twice a day	20	17.4
	3 or more times a day	1	0.9
	Total	81	
Eats with others	Almost never	1	0.9
	1-2 times/wk.	23	19.8
	3-4 times/wk.	31	26.7
	5 or more times/wk.	61	52.6
	Total	116	
Diet Experience	Yes	76	65.5
	No	40	34.5
	Total	116	
Desires to change eating habits	Yes	62	53.4
	No	54	46.6
	Total	116	

Health information use and trust. Overall, survey respondents rated family, television and friends as their greatest sources of health information, and alternative medical practitioners and the newspaper as the sources from which they obtained the least health information (Table 5). In terms of trust, the students regarded the information provided by traditional medical practitioners most trustworthy, followed by family and alternative medical practitioners. Students trusted information from the Internet least, particularly Internet information accessed via mobile phones. Skewness and kurtosis of all variables was below or around |1|, with the exception of the amount of usage of alternative medical practitioners, which had a skewness of 1.74 and kurtosis of 2.16.

Table 5

Usage and Trust in Health Information Sources

Information Source	Amount of Usage		Trust	
	Mean	SD	Mean	SD
Internet via PC	2.85	1.40	3.15	.75
Internet via Cell Phone	2.10	1.20	2.76	.85
Television	3.69	1.16	3.46	.86
Magazines	3.14	1.22	3.39	.78
Newspapers	1.97	1.07	3.58	.88
Books	2.34	1.18	3.83	.87
Traditional Medical Practitioners	2.10	1.19	4.28	.93
Alternative Medical Practitioners	1.61	1.04	3.63	1.03
Family	3.91	1.05	3.78	.86
Friends	3.40	1.09	3.37	.83

Note: Ratings were on a five-point scale. In the case of information usage, 1 was "almost none" and 5 was "a great deal." In the case of trust, 1 was "not at all" and 5 was "a great deal."

Among the sample, 27% (n=32) indicated that they had previously searched for information relating to either health or nutrition, while 73% (n=85) indicated that they had not. The most common search topics were: dieting information, recipes, nutritional and calorie content, headaches, stamina foods, low-calorie foods and allergies (Appendix J).

Question 12.2 asked survey respondents to specify the sites that they used in health and nutrition-related information searches. The only source, other than the search engines Yahoo! and Google, that was regularly mentioned was Cookpad (http://cookpad.com). The site was also mentioned by a number of interviewees. One individual mentioned that many students who lived by themselves would access the site to look for recipes, and that among those who contributed recipes on the site, there were many older women who, perhaps due to years of experience as housewives and mothers, had a great deal of cooking knowledge and were very willing to share it with these young people.

Factor Analysis of the Food Choice Questionnaire

The initial factor analysis, including all 40 items of the amended version of the Food Choice Questionnaire, resulted in 11 factors: content, convenience, appeal, health, weight control, mood, familiarity, aesthetics, price, satisfaction and ethical concern (Appendix G). The initial structure evinced a number of problems, including loadings of less than 0.40 on a number of items, two factors that did not clearly represent unitary constructs (mood and appeal), and four factors composed of only two items each. The appeal dimension consisted of five items from a number of different dimensions: 12 “Is good value for the money,” 13 “Cheers me up,” 14 “Smells nice,” 16 “Helps me cope with stress,” and 18 “Has a pleasant texture.” The mood dimension consisted of four items from the original Food Choice Questionnaire, as well as one other item, 27 “Is high in protein.” In order to render a more satisfactory factor structure, different combinations of items were tested to find a model satisfying the following criteria: consisting of items with high loadings (>0.4) on a single factor; satisfactory scale reliability and item statistics (scale reliability of at least 0.70 and item-total correlations of at least 0.40); and communalities greater than 0.3 among the items included in the factor analysis.

The final structure consisted of seven factors: consumption experience, convenience, health, weight control, natural content, familiarity and price (Appendix H), and accounted for 57.96% of the communal variance. Each factor consisted of three to six items, with the exception of price, which consisted of only two. However, both items had high loadings and item-to-total correlations (α=.70), and overall subscale reliability was good (α=.82). The reliabilities of the other dimensions ranged from α=.75 to α=.87 (Table 6).

Table 6

Descriptive Statistics and Reliability of 27-Item FCQ

Item	Mean	SD	r^a	*Cronbach's α*
Consumption Experience	3.68	0.738		.827
16 Cope w. stress	3.49	1.047	0.65	
31 Makes me feel good	3.87	0.943	0.68	
13 Cheers me up	4.05	1.007	0.62	
25 Looks nice	3.53	0.988	0.59	
26 Helps me relax	3.42	1.061	0.54	
14 Smells nice	3.71	1.001	0.51	
Convenience	3.82	0.722		.834
15 Simple to cook	3.74	0.939	0.75	
1 Easy prep.	3.74	0.976	0.61	
28 No prep. time	3.85	0.912	0.69	
11 Avail. shops	3.93	0.888	0.58	
35 Close to work/home	3.82	0.935	0.55	
Health	4.02	0.667		.806
30 Good for skin	3.72	0.999	0.56	
37 Vegetables	4.15	0.826	0.64	
29 Healthy	4.37	0.772	0.61	
22 Vita. & mineral	3.95	0.927	0.61	
38 Many dishes	3.89	0.904	0.57	
Weight Control	3.37	0.983		.865
7 Low in fat	3.29	1.115	0.77	
3 Low in calories	3.41	1.076	0.77	
17 Control weight	3.42	1.131	0.69	
Content	3.45	0.781		.750
5 Nat. ingredient	3.62	0.899	0.66	
23 No artificial…	3.50	0.935	0.56	
2 No additives	3.24	1.031	0.53	
Familiarity	3.38	0.866		.753
33 What I usu. eat	3.62	1.006	0.60	
21 Food from childhood	3.16	1.122	0.61	
8 Familiar	3.36	1.044	0.54	
Price	3.97	0.833		.822
36 Cheap	4.02	0.871	0.7	
6 Not expensive	3.93	0.935	0.7	

[a]Item-to-total correlation.

The means for each motivational factor were calculated by first computing the factor scores for each subject by averaging all the composite items for each dimension, and then

computing the average of all subjects, for each factor. Overall, the sample exhibited the highest levels of concern for health, price and convenience, in that order.

Though the initial factor structure bore similarities to that proposed by Steptoe, Pollard and Wardle (1995; Appendix E), there were notable differences. Three dimensions consisted of the same items as in the original Food Choice Questionnaire: convenience, weight control and familiarity. Although the price dimension was composed of only two items, those two items had consistently high loadings; thus this dimension was retained in the final factor structure. The health dimension consisted of three items from the health dimension of the original FCQ, 22, 29 and 30, as well as two items that were added to the revised version administered in this study. All of the items that composed the health dimension had fairly high loadings which remained stable regardless of the different combinations of items that were tested; thus the health dimension in the initial and final factor structure were the same.

The content dimension was composed of the three items in the original "Natural Content" factor, as well as three other items: 9, 10 and 19. However, as Items 9 and 10 had loadings lower than 0.40 in various item combinations, these two items were ultimately removed from the analysis. Items 19, 20 and 32, which belonged to the ethical concern dimension of the original FCQ, demonstrated a tendency to either straddle dimensions, or load onto the content dimension. However, as their loadings also tended to fall below 0.40, they were removed from the analysis. Thus, the final content dimension in this study consists of the same items as the natural content dimension in the original FCQ. However, it was named "Content" as opposed to "Natural Content," because in the process of trying

different item combinations, it was clear that the underlying construct was not "natural content," but "content."

The consumption experience dimension consisted of items from the mood and sensory appeal dimensions of the original FCQ: Item 13 "Cheers me up," Item 14 "Smells nice," Item 16 "Helps me cope with stress," Item 25 "Looks nice," Item 26 "Helps me relax," and Item 31 "Makes me feel good." This dimension consisted primarily of items from the appeal and mood dimensions of the initial 40-item factor analysis. As various combinations of items were tested, it became apparent that these two dimensions were intimately related. Though use of the oblique rotation was attempted to see if it would be possible to find a solution that would replicate the dimensions proposed by Steptoe, Pollard and Wardle (1995), it was not possible to find a solution in which the original sensory appeal items would comprise one factor, and the mood items would comprise another. The consumption experience factor that was ultimately rendered includes items from both the sensory appeal and mood dimensions of the original FCQ. This factor exhibited good reliability, and illustrated the relationship between sensory appeal and mood in terms of the close visceral connection between the initial attraction that food holds for an individual, and the effects of its consumption.

Segmentation of Food Choice Motivations

Stem-and-leaf and box plots used to examine the factor scores revealed the presence of three outliers in the sample. One outlier each was found for the consumption experience, convenience and familiarity factors. The outlier for consumption experience was 3.2 standard deviations below the mean. When this outlier was included in the cluster analysis, its extreme value tended to bias the results; therefore it was excluded from the

analysis. The outliers in the convenience and familiarity deviations were 2.6 and 2.7 standard deviations below the mean, respectively, and did not bias the results when included; thus, these two cases were included in the cluster analysis.

Hierarchical cluster analysis was performed with the factor scores from the 27-item FCQ, using the average link within-groups method and squared Euclidean distance as the distance measure. Five clusters were identified on the basis of the agglomeration schedule and interpretability of factors. Post-hoc Games-Howell ANOVAS ($p<0.05$) demonstrated that there were significant differences among the clusters (Table 7).

Table 7

Factor Scores of the 27-Item FCQ for the Five-Cluster Solution

	Cluster				
Food Choice Dimension	1: Convenience & Price Conscious	2: Weight Conscious	3: Concerned with Content	4: Food Indifferent	5: Experience & Health-Oriented
	n=14	*n=36*	*N=13*	*n=35*	*n=18*
Consumption Experience	-0.393	0.426	-0.955	-0.228	**0.766**
Convenience	**1.098**	**0.624**	**-1.116**	**-0.540**	**-0.236**
Health	-0.185	**0.540**	-0.652	-0.667	**0.919**
Weight Control	-0.772	**0.848**	0.064	-0.500	-0.126
Content	-0.265	0.047	0.715	-0.395	0.453
Familiarity	-0.433	0.437	**-1.219**	0.047	0.333
Price	**1.043**	**0.555**	-0.553	-0.586	-0.355

Note: Scores in bold indicate significant differences with the means of three or four other clusters ($p<0.05$). Factor scores were computed using the regression method, and thus are centered around a mean of 0, and a standard deviation equal to the shared multiple correlations of the factors and variables (Tabachnick & Fidell, 2007).

Cluster 1, "Convenience and Price Conscious," was distinguishable from the other clusters by high scores on convenience and price. Cluster 2, "Weight Conscious," obtained high scores on weight control, convenience, health and price relative to other clusters. Cluster 3, "Concerned with Content," was characterized by a high score on

content compared to other clusters, and low scores on all other dimensions, particularly convenience and familiarity. Cluster 4, "Food Indifferent," gave relatively low ratings to all dimensions. Cluster 5, "Experience and Health-Oriented," scored significantly higher than other clusters on both consumption experience and health. They also scored fairly high on content and familiarity, and relatively low on all remaining dimensions.

Differentiating Clusters by Personal Characteristics, Diet and Information Use

Personal characteristics. Chi-square and Fisher's exact tests were used to compare the clusters in terms of various individual characteristics (Table 8). Significant differences were found for three characteristics: gender, living with parents, and living alone. There were twice as many male members in Cluster 4, Food Indifferent, as one might expect based on the percentage of males in the sample, and there were half as many as expected in Cluster 2, Weight Conscious. With regard to females, there were more than expected in Clusters 2, Weight Conscious, and Cluster 5, Experience and Health-Oriented, and fewer than expected in Cluster 4, Food Indifferent. With regard to living situation, members of Clusters 1, Convenience and Price Conscious, and 2, Weight Conscious, were more likely not to live with their parents, and members of Clusters 4, Food Indifferent, and 5, Experience and Health-Oriented, were more likely to live with their parents. Conversely, the members of Clusters 1 and 2 were more likely to live alone, and Clusters 4 and 5 were less likely to live alone.

Table 8

Cluster Differences Based on Personal Characteristics

	1:Convenience/Price Conscious	2: Weight Conscious	3:Concerned with Content	4: Food Indifferent	5: Exp. & Health-Oriented	Total	Chi-square Test[a]	Fisher's exact test[a]
Gender								
Male	3	3	2	12	1	21	χ^2=10.46, df=4, *p*=.031*	*p*=.033*
Female	11	33	10	23	17	94		
Job								
Yes	9	25	10	23	15	82	χ^2=3.87, df=4, *p*=.436	*p*=.439
No	5	11	2	11	2	31		
Exercise								
Yes	6	14	5	11	7	43	χ^2=1.16, df=4, *p*=.893	*p*=.874
No	8	22	6	24	10	70		
Cooking Experience								
Yes	10	18	5	17	6	56	χ^2=4.86, df=4, *p*=.311	*p*=.311
No	4	18	7	18	12	59		
Overseas Experience								
Yes	12	31	9	29	16	97	χ^2=2.28, df=4, *p*=.610	*p*=.647
No	1	5	3	6	1	16		
Lives with Parents								
Yes	3	20	9	25	15	72	χ^2=17.88, df=4, *p*=.001*	*p*=.002*
No	10	14	3	7	2	36		
Lives Alone								
Yes	6	12	1	3	1	23	χ^2=15.09, df=4, *p*=.004*	*p*=.005*
No	7	22	11	29	16	85		

[a]Calculated using the Exact method from PASW Statistics 18.0's Exact tests module; *p<.05

A univariate ANOVA was conducted to determine whether clusters differed in terms of their overall health concern, and a significant main effect was found (Table 9). Games-Howell post-hoc analyses revealed significant pairwise differences between clusters 1 and 5.

Table 9

Cluster-wise Differences in Health Concern

	Health Concern	
	Mean	SD
1: Convenience and Price Conscious	3.43	.76
2: Weight Conscious	4.00	.83
3: Concerned with Content	3.91	.70
4: Food Indifferent	3.80	.76
5: Experience and Health-Oriented	4.28	.67
$F(4, 109)=2.74$, $p=0.03$		

Diet. Chi-square and Fisher's exact tests were used to determine whether the members of the clusters differed in terms of their eating habits (Table 10). Significant differences were found in the number of snacks they had per day, frequency of fruit consumption and desire to change current eating habits.

Fisher's exact test found a significant difference among the clusters in terms of the number of snacks students had per day. In Cluster 5, Experience and Health-Oriented, six individuals indicated that they "almost never" had snacked (the expected number of individuals was 2.5). In Clusters 1, Convenience and Price Conscious and 2, Weight Conscious, on the other hand, fewer than the expected number of individuals indicated that they "almost never" snacked.

Table 10

Cluster Differentiation Based on Eating Habits

Eating Habits		1:Convenience/Price	2: Weight Conscious	3: Concern with Content	4: Food Indifferent	5: Exp./ Health	Total	Chi-square Test[a]	Fisher's exact test[a]
Meals per day	1 time	0	1	0	1	0	2	χ^2=9.74, df=15, *p*=.67	*p*=.676
	2 times	5	7	1	8	3	24		
	3 times	8	23	12	22	15	80		
	Four or more times	1	4	0	4	0	9		
Snacks per day	Almost never	0	2	2	6	6	16	χ^2=23.04, df=12, *p*=.03*	*p*=.030*
	One time	8	21	4	14	7	54		
	Two times	2	10	6	8	5	31		
	Three or more	4	2	1	7	0	14		
Eats breakfast	Rarely	3	4	0	3	2	12	χ^2=9.11, df=12, *p*=.71	*p*=.761
	1-2 times/wk.	2	3	0	5	1	11		
	3-4 times/wk.	1	9	4	6	3	23		
	Daily	8	19	9	21	12	69		
Consumes vegetables	Less than 1 time/day	2	2	1	1	0	6	χ^2=15.12, df=12, *p*=.23	*p*=.186
	Once a day	5	12	1	14	3	35		
	Twice a day	6	15	7	11	12	51		
	3 or more times/day	1	5	4	9	3	22		
Consumes fruits	Less than 1 time/day	8	12	2	11	3	36	χ^2=24.97, df=12, *p*=.01*	*p*=.010*
	Once a day	6	20	4	16	11	57		
	Twice a day	0	2	7	7	4	20		
	3 or more times/day	0	1	0	0	0	1		
Eats with Others	Almost never	0	1	0	0	0	1	χ^2=12.60, df=12, *p*=.41	*p*=.352
	1-2 times/wk.	1	8	2	10	2	23		
	3-4 times/wk.	3	12	2	10	3	30		
	5 or more times/wk.	10	14	9	15	13	61		
Diet Exp.	Yes	6	29	8	21	11	75	χ^2=8.52, df=4, *p*=.08	*p*=.066
	No	8	6	5	14	7	40		
Desire Change	Yes	11	24	6	14	7	62	χ^2=11.13, df=4, *p*=.03*	*p*=.027*
	No	3	11	7	21	11	53		

[a]Calculated using the Monte Carlo method from PASW Statistics 18.0's Exact tests module; *p<.05

The clusters differed in terms of frequency of fruit consumption. On average, Clusters 1, Convenience and Price Conscious, and 2, Weight Conscious, consumed fruit less often, with fewer than the expected number of individuals consuming fruit twice a day or more. Clusters 3, Concerned with Content tended towards the opposite direction, with fewer than the expected number of individuals consuming fruit once a day, or less often than once a day. Cluster 5, Experience and Health-Oriented, included three individuals who consumed fruit less than once a day, as opposed to an expected number of 6.

The clusters also varied in terms of desire to change current eating habits. With regard to the desire to change current habits, Clusters 1, Convenience and Price Conscious, and 2, Weight Conscious, demonstrated a marked desire for change, and Clusters 4, Food Indifferent, and 5, Experience and Health-Oriented, were not inclined to desire change.

Health information behaviors. Univariate ANOVAs with Games-Howell post-hoc analyses were conducted to determine whether use of information sources varied among clusters (Table 11). A significant main effect was found only for family as a health information source. Games-Howell post-hoc comparisons indicated that Cluster 5, Experience and Health-Oriented, obtained significantly more health information from family than Clusters 1, 2 and 4 ($p<.05$). Cluster 3, Concerned with Content, assigned the highest rating to television as well as all three forms of print media (magazines, newspapers and books), though the main effects were not significant.

Table 11

Amount of Information Use by Cluster

Information Source	Cluster Number 1:Convenience/Price Conscious Mean(SD)	2: Weight Conscious Mean(SD)	3: Concerned with Content Mean(SD)	4: Food Indifferent Mean(SD)	5: Exp. and Health-Oriented Mean(SD)	F	*p*-value
Internet via PC	2.21(1.58)	3.00(1.47)	2.85(1.28)	2.83(1.18)	3.06(1.63)	0.91	0.459
Internet via Cell Phone	1.50(0.76)	2.17(1.18)	2.31(1.44)	2.14(1.14)	2.22(1.44)	1.05	0.384
Television	3.00(1.18)	3.75(1.16)	4.08(1.12)	3.63(1.09)	3.94(1.21)	1.92	0.111
Magazine	2.57(1.40)	3.25(1.30)	3.38(1.04)	2.94(1.06)	3.50(1.29)	1.60	0.180
Newspaper	1.50(0.86)	1.92(1.25)	2.46(0.97)	2.00(0.87)	2.06(1.21)	1.43	0.230
Books	1.79(0.58)	2.33(1.27)	2.77(1.24)	2.40(1.19)	2.44(1.25)	1.27	0.288
Trad. Med.	1.86(1.41)	2.22(1.22)	2.42(0.67)	2.00(1.11)	2.11(1.41)	0.50	0.734
Alt. Med.	1.50(0.94)	1.94(1.22)	1.50(0.91)	1.49(1.01)	1.38(0.81)	1.33	0.264
Family	3.50(1.02)	3.64(1.10)	4.23(1.01)	3.89(0.99)	4.61(0.78)	3.77	0.007*
Friends	3.36(1.15)	3.42(1.18)	3.69(0.95)	3.20(1.11)	3.59(1.00)	0.64	0.632

*$p<.05$

Univariate ANOVAs were conducted to examine whether clusters differed in the extent to which they trusted various health information sources (Table 12). Significant main effects were found for magazines, practitioners of traditional Western medicine and friends. Post-hoc analyses found significant differences between Clusters 4, Food Indifferent, and 5, Experience and Health-Oriented, in terms of trust in practitioners of traditional medicine (Games-Howell post-hoc paired ANOVA tests, $p<.05$). Significant differences were also found in terms of trust for friends, with Cluster 5, Experience and Health-Oriented, demonstrating a significantly greater amount of trust in friends than Clusters 1, 3 and 4. Cluster 2, Weight Conscious, also demonstrated a significantly greater amount of trust than Cluster 3 (Games-Howell post-hoc paired ANOVA tests,

p<.05). Cluster 5, Experience and Health-Oriented, indicated the highest level of trust among all clusters for each information source.

Table 12

Trust in Information Sources by Cluster

Information Source	Cluster Number					F	*p*-value
	1:Convenience/Price Conscious Mean(SD)	2: Weight Conscious Mean(SD)	3: Concerned with Content Mean(SD)	4: Food Indifferent Mean(SD)	5: Exp. And Health-Oriented Mean(SD)		
Internet via PC	3.21(0.70)	3.19(0.67)	2.83(0.58)	3.11(0.87)	3.28(0.83)	0.73	0.573
Internet via Cell Phone	2.79(0.89)	2.83(0.78)	2.50(0.80)	2.63(0.91)	3.00(0.91)	0.91	0.463
Television	3.21(1.19)	3.61(0.73)	3.33(1.07)	3.31(0.76)	3.67(0.84)	1.14	0.341
Magazine	3.00(0.88)	3.58(0.65)	3.08(0.79)	3.23(0.77)	3.78(0.73)	3.71	0.007*
Newspaper	3.50(1.09)	3.69(0.82)	3.42(0.79)	3.31(0.93)	4.00(0.59)	2.20	0.074
Books	3.71(1.33)	3.86(0.83)	3.92(0.67)	3.66(0.84)	4.11(0.68)	0.91	0.459
Trad. Med.	4.07(1.14)	4.42(0.84)	4.33(0.99)	3.97(1.00)	4.72(0.57)	2.43	0.052*
Alt. Med.	3.43(1.09)	3.83(0.97)	3.75(1.06)	3.33(1.05)	3.83(1.04)	1.39	0.244
Family	3.43(1.02)	3.86(0.77)	3.58(0.67)	3.71(0.89)	4.22(0.81)	2.15	0.080
Friends	3.07(0.73)	3.60(0.74)	2.92(0.67)	3.17(0.86)	3.89(0.83)	4.79	0.001*

*p<.05

Discussion

This study had three primary objectives: to explore the food choice motivations of Japanese university students using a previously developed multidimensional instrument; to identify subgroups of individuals who shared similar food choice patterns; and finally, to determine if these subgroups differed in their personal characteristics, eating habits and health information behaviors. With regard to the first objective, a Japanese version of the previously existing Food Choice Questionnaire was developed and administered to a group of Japanese university students. As a number of items were added to the original FCQ, exploratory factor analysis was used to generate a factor structure that best fit the data. The final factor structure consisted of 27 items distributed across seven factors: consumption experience, convenience, health, weight control, content, familiarity and price.

Cluster analysis was conducted using the factor scores for each subject to investigate whether subgroups could be identified among the sample who shared common patterns of food choice motivations. A five-cluster solution was selected based on the agglomeration schedule and interpretability of factors. The results of Chi-square and ANOVA tests indicated that the clusters did differ in some of their personal characteristics, eating habits, and health information behaviors.

The results of the factor analysis of the FCQ adapted for use in this study have various implications which may be useful for future administrations of this instrument, and for multidimensional and cross-cultural comparisons of food choice in general.

This section will discuss these implications, and then examine the five-cluster solution as a characterization of different groups of young people, with varying patterns of food choice motivations.

Applying the Food Choice Questionnaire to Contexts across Space and Time

Since its development in 1995, Steptoe, Pollard and Wardle's (1995) Food Choice Questionnaire has been administered and revised by numerous other researchers. Although not originally intended as a cross-cultural assessment, today it has become such an instrument, and in that sense plays an important role in research concerning food choice motivations. However, past researchers have also observed that there may be various issues regarding the statistical robustness and applicability of the questionnaire across different populations.

With regard to future use of the FCQ as a multidimensional instrument, a number of issues emerged in this study which would be useful to consider in the future. One concern that has been raised is that there are dimensions of food choice that may not be reflected in the questionnaire (Eertmans et al., 2006; Lindeman & Väänänen, 2000). In order to explore whether this might be the case, this author conducted preliminary interviews to determine if there were food choice dimensions that should be added to the questionnaire for administration in Japan. Following the interviews, four items were added: 37 "Includes a lot of vegetables," 38 "Consists of many dishes," 39 "Keeps me full," and 40 "Consists of colors that look good together."

Items 37 and 38 loaded onto the health factor. Items 39 and 40 appeared as parts of two new factors: satisfaction and aesthetics. As both factors consisted of just two items each, and both Item 4 and Item 25 had high loadings on at least one other dimension, these

two items were deleted and the factors were not retained. However, the emergence of these factors suggests that satisfaction and aesthetics might be dimensions to explore in a future multidimensional assessment of food choice motivations. Item 39 “Keeps me full”, in particular, emerged frequently in the interviews. The students tended to select foods that would fill up their stomachs and sustain them because they were often busy and did not have time to eat, but at the same time were active in a variety of clubs and activities that required that they maintain their stamina. Their strategies for doing so included consuming carbohydrate-rich foods and drinking soy milk, at the very least, when they did not have time for breakfast.

There is also the possibility that certain items could be phrased differently to better suit the demographic of one’s sample. Though the convenience dimension remained intact in the final factor analysis, Item 35 “Can be bought in shops close to where I live or work,” had a borderline loading (.415), and its loading in the initial pattern matrix was even lower (.321). This may perhaps be because, as university students, the item should refer to home and school, instead of home and workplace. Previous literature has often discussed cross-cultural reasons for making modifications to the questionnaire, but the above case suggests that there may be reasons to consider modifying the questionnaire even if it is to be administered to a different demographic stratum within the same national group.

Item 27 “Is high in protein” was a particularly interesting case. Although it exhibited a fairly high loading on the health factor, which was the factor it belonged to in the original FCQ, in this administration of the FCQ, Item 27 aligned with the mood factor rather than the health factor. One reason for this tendency might be the way that protein is portrayed in various information sources. For example, in an article about beef on

AllAbout, protein from beef was depicted as a great way to not only increase one's energy, stamina and immunity, but also to relieve stress and combat fatigue (Kaneko, 2010). Thus, given differences in the ways certain concepts are presented in various cultures, it may be necessary to modify or even replace items in the FCQ.

As various researchers (Eertmans et al., 2006; Fotopoulos et al., 2009) have suggested, there may be a need to re-consider various dimensions of the FCQ to increase its statistical robustness. The results of this administration of the questionnaire also indicate that it may be necessary to modify certain dimensions for use with a Japanese population, and possibly other populations. These dimensions include: natural content, ethical concern, sensory appeal and mood. In this study, the content dimension consisted of the items in the natural content dimension of the original FCQ. However, it was named "Content" to capture the overall semantic meaning of the items that tended to load onto it, including Item 9 "Is high in fiber and roughage," Item 10 "Is nutritious" and Items 19, 20 and 32, which comprised the original ethical concern dimension. One might surmise that, in the initial factor structure, Items 9 and 10 appeared as part of the content dimension rather than the health dimension because two new items, 37 "Includes lots of vegetables" and 38 "Consists of many dishes," were added, and they loaded onto the health dimension. But it is interesting to note that, if the original 36 items of the FCQ are factor analyzed without the additional four items, the natural content and ethical concern items comprise one factor, as they did in Sun's (2008) study, and Items 9 and 10 form their own factor.

One possible explanation for this similarity with Sun's (2008) study and difference from previous studies is that there are conceptual differences underlying the way health

and eating are viewed in various cultures. Differences between countries where food and health-related beliefs are based on Traditional Chinese Medicine, and those that are based on Western medicine might be particularly salient. An interview study of 50 families in Hong Kong found that proper selection, timing and preparation of food was the most common lay method for preventing and dealing with 59 common symptoms and illnesses (Koo, 1984). These principles were based on the traditional concept of maintaining body homeostasis by consuming foods that maintained the hot/cold, wet/dry qualities of body energy, reducing intake of "irritating" or "poisonous" foods that disturbed the normal flow of energy. Wu (1995) observed that, as Western concepts of nutrition gradually became the prevailing view, young Chinese struggled with the question of whether to follow traditional Chinese or Western guidelines regarding nutrition. Rather than selecting one or the other, he suggested that young people accept the existence of both, and adopt the appropriate one depending on the circumstance. Though this author does not know of a similar study in Japan, traditional Japanese views of food do incorporate views from Chinese medicine (Tsuchiya, 1985), and previous literature has observed differences between Western and Japanese conceptions of nutrition (Akamatsu et al., 2005).

Young Japanese may be facing a situation similar to that described by Wu (1995) in which Eastern and Western ways of viewing health and nutrition co-exist, and they are faced with the task of integrating these different views. In countries where the views of Western medicine are predominant, people might be accustomed to equating fiber (Item 9), nutrients (Item 10) and protein (Item 27) intake to healthy eating; however, these may not be the aspects of healthy eating that are most salient to individuals of other cultures. Fiber,

nutrients and protein might be seen as issues of content, which are then related to health, but these items may perhaps not have as direct a connection to health as the other items that comprised the health factor.

In addition to the re-conceptualization of "content," the ethical concern dimension from the original FCQ also calls for further consideration. As mentioned previously, the items that loaded onto the ethical concern factor in the original FCQ demonstrated a distinct tendency to load onto the content factor in the current study. Examining the initial pattern matrix, one can see that Item 19 "Is packaged in an environmentally friendly way," loaded onto the content dimension, and 20 "Comes from countries I approve of politically," and 32 "Has the country of origin clearly marked," loaded onto a separate dimension. However, as different combinations of items were selected in the factor analysis, it quickly became apparent that these two items also tended to load onto the content dimension, as they actually did in Sun's (2008) study of Taiwanese university students.

The results of these two studies suggest that, in Taiwan and Japan, the ethical concern items proposed by Steptoe, Pollard and Wardle (1995) may evoke a strong connotative meaning with regard to food content rather than ethics. As discussed in the literature review, it is possible that, due to the BSE crisis, the situation today may be different from what it was in 1995 when Steptoe et al. first developed the FCQ. Furthermore, in Japan, country of origin may have even stronger implications with regard to food content due to negative press coverage regarding Chinese food imports. The items that originally comprised the ethical concern dimension also illustrated that food choice motivations might change over time or vary from region to region. With regard to future

administrations of the FCQ in Japan, as other researchers (Eertmans et al., 2006; Fotopoulos et al., 2009; Sun, 2008) have also observed problems with the ethical concern dimension, it may be useful to consider other scales that provide a more complete assessment of ethical concern, such as those developed by Lindeman and Väänänen (2000).

The sensory appeal and mood dimensions of the original FCQ also evinced certain weaknesses in this study. With regard to sensory appeal, the different senses appeared to correlate with other items more than with each other. This may be because the members of the sample, and perhaps others as well, consider taste and aesthetics to be qualitatively different from smell and texture as sources of motivation. It is perhaps also worthwhile to note that the initial appeal factor consisted of two items from the mood factor of the original FCQ: 13 “Cheers me up” and 16 “Helps me cope with stress,” which suggests an alternative interpretation -- that individuals select foods with certain sensory qualities because they are “soothing” or “comforting” and evoke a pleasant affective state. The mood items that comprised their own factor then represent those food choices that help individuals take an active approach in dealing with life: 26 “Helps me relax,” 34 “Helps me cope with life,” 31 “Makes me feel good,” 27 “Is high in protein” and 24 “Keeps me awake/alert.”

The items in the mood factor proved to be the most difficult to handle, not only in the translation, but also in the subsequent factor analysis. The mood factor that was rendered in the initial factor structure demonstrated adequate reliability (α=.76); however, three factor loadings were below 0.5, and Item 24 had a low communality estimate (.341). In future administrations of the FCQ, it may be useful to develop a larger number of

mood-related items suitable for the target population. This dimension may then be more fully developed.

The results of this study have various implications for future use of the FCQ as a multidimensional assessment for examining food choice. First, before administering the instrument, it is useful to consider whether there might be dimensions of food choice that are applicable to the target population which are not reflected in the scale. Next, it might be necessary to alter the phrasing of certain items to make it applicable to the population in question. Differences in interpretation of or salience of items may arise from a variety of factors: differing cultural systems for conceptualizing health and nutrition, portrayal of relevant constructs through the media, and temporal events. Lastly, there may be a need to reconsider various dimensions of the FCQ in order to improve its statistical properties. Researchers are encouraged to review the versions of the scale that have previously been used and refine it as necessary to fit their target populations.

Characterizing Clusters of Shared Food Choice Motivations

Cluster analysis identified five subgroups that were distinguishable from one another by their food choice motivations. Chi-square and univariate ANOVA analyses demonstrated these subgroups also differed from one another by various individual characteristics, eating habits and information behaviors. This section will bring together these two sets of results, providing a multi-faceted characterization of each cluster.

Cluster 1, Convenience and Price Conscious. The individuals in Cluster 1 cared significantly more about convenience and price than the other clusters. They also cared little about controlling their weight relative to the other clusters. As the individuals in this

cluster were more likely to live alone, they perhaps experienced more financial pressure and were less likely to eat well-balanced and consistent meals because there was no one to help out with groceries and preparation of meals. In terms of eating habits, fewer individuals in this group indicated that they "almost never" snacked, and they were less likely to consume fruit compared to the other groups. Interestingly, though they expressed a great amount of desire to change their eating habits, they were less likely than the other groups to have dieted, and they scored the lowest of all groups on weight control motivations. This might be because, for those living on their own, it was already a struggle to maintain a healthy diet, to say nothing of dieting for weight loss. However, members of this cluster were aware that they were perhaps not eating healthfully; thus the majority of them indicated that they would like to change their diets.

Cluster 2, Weight-Conscious. Overall, the individuals in Cluster 2 valued convenience and price, though perhaps not as much as those in Cluster 1. As with Cluster 1, few individuals in Cluster 2 indicated that they "almost never" snacked, and members of Cluster 2 also consumed fruits less often than those in other clusters. However, unlike Cluster 1, members of Cluster 2 were very concerned about weight control. Twenty-nine individuals indicated that they had previously dieted (as opposed to an expected value of 23), and twenty-four individuals indicated that they currently desired to change their eating habits (as opposed to an expected value of 19). The composite makeup of this cluster in terms of gender differed from the sample as a whole. There were less than half the expected number of males (7), and a slightly greater number of females than expected. These results suggest that women tended to be more concerned than men about weight, and those who diet may discuss what they know about health and nutrition with friends. There were

also more members of this cluster living alone than would be expected (the number of individuals who lived alone was 12, as opposed to an expected number of 7).

Cluster 3, Concerned with Content. Relative to other clusters, members of Cluster 3 showed highly on the content factor, but low on all the other factors, suggesting that they were concerned about food content, but did not have any other strong food-related concerns. They tended towards more frequent consumption of fruits; this might have been because the members of the cluster tended to live with others who could share the burden of buying groceries and preparing meals. This cluster also appeared to consume media from traditional channels such as television and print material in greater amounts relative to students in other clusters, though the difference was not statistically significant.

Cluster 4, Food Indifferent. The members of Cluster 4 demonstrated little concern for any of the food choice dimensions. They showed the lowest level of concern for health and content among the clusters, and next to lowest for weight control. They were also less likely to desire change than the sample as a whole. Interestingly, the only dimension that Cluster 4 did not assign a particularly low rating to was familiarity. As only three members of this cluster (as opposed to an expected number of 7) lived alone, living with others perhaps explained their relative lack of concern with their needs for sustenance in general, and for convenience and price in particular. There were also twice as many males in this cluster as expected (there were 12, and the expected number was 6). The gender skew might also play a role in the lack of concern with health, the content of foods, and the consumption experience.

Cluster 5, Experience and Health-Oriented. The individuals in Cluster 5 were most concerned about the consumption experience and health. This cluster showed a tendency not to snack and they consumed fruit more often than the rest of the sample as a whole. Overall, they were somewhat more inclined to be satisfied with their diet, with 11, as opposed to an expected 8, indicating that they did not desire to change their diet. This group obtained more health information from family than other clusters. They also indicated a higher level of trust in their friends as a source of health information than did members of other clusters. The male-female distribution was slightly skewed towards females, and there were slightly more students who lived with their parents than there were overall in the sample. There was only one student, as opposed to an expected 4, who lived alone.

Overall, it appears that communal living might have enabled these individuals to be less concerned with fundamental realities of eating, such as price and convenience, so that they could enjoy aspects of the consumption experience as well as consider their health. They believed that they ate healthfully and were satisfied with their diet, and therefore were also less concerned with weight control. They indicated that they received a great amount of health information from family; perhaps this information provided them with a good background in basic health and nutritional knowledge. They also placed a high amount of trust in health information from friends and family, which may have served as a basic level of social support that could serve as a tether for them as they sought healthful ways to live their daily lives.

Contemplating demographics and information use. Considering the clusters found in this study, various patterns emerge. First, as previous literature has also found,

gender appeared to play a role in food choice motivations. Women were more likely to be part of Cluster 2, which demonstrated a heightened concern for weight control, and men were more likely to be part of Cluster 4, which consisted of individuals who did not exhibit a great deal of concern on any of the food choice dimensions.

Second, living situation also affected food choice motivations. Clusters 1, Convenience and Price Conscious, and 2, Weight Control, were comprised of a higher number of individuals who lived alone than other clusters. Clusters 1 and 2 snacked more, consumed less fruit, and were more likely to desire to change their diet than other clusters. Living alone might cause individuals to experience more financial pressure and difficulty maintaining a healthy diet. Aside from not having ready-prepared food at home, it is possible that they also tended to work more, and therefore snacked before or after their part-time jobs. They seemed aware that there are aspects of their diet that could be improved, but perhaps found it difficult to do so in their financial and living situations.

Those who lived with others, particularly parents, might be less concerned with convenience and price because someone else might be shopping for groceries and preparing meals for them. In the interviews, there were also individuals who mentioned that they learned what types of food to eat, and how to cook, from their mothers. However, it is important to note that living with parents does not necessarily mean that individuals are imparted with more knowledge of or concern with health and nutrition. Clusters 4, Food Indifferent, and 5, Experience and Health-Oriented, consisted of a higher proportion of individuals living with their parents, yet only Cluster 5 was particularly concerned with health. Cluster 4 was least concerned about content; this cluster gave the lowest rating to parents as a health information source among all the clusters.

Although there is the possibility that some individuals may learn a great deal from their parents regarding health and nutrition, there are also various other possible scenarios. For example, both parents may work and pick up ready-prepared food for dinner. The majority of the students also worked part-time. In such cases, it is likely that they took their meals at their place of employment, or picked up something on the way home. In the interviews, it was clear that a variety of different influences were at play, including whether parents prepared or brought home meals, whether the students themselves worked, and also the media from which they obtained health and nutrition information.

Finally, there may be a connection between traditional sources of media consumption and concern with food content. Clusters 3, Concerned with Content, and 5, Experience and Health-Oriented, rated content more highly than the other clusters; their mean ratings for television and print media were also higher than the other clusters, though the differences were not statistically significant. It may be that there is a connection between consumption of media and concern about food content which may have been statistically significant with a larger sample. As the literature also suggests consumption of media may lead to greater awareness of possible food content concerns (Rosenberger, 2009), this connection is one that merits further investigation.

Limitations

This study has various limitations. One of these was the nature and size of the sample. A large proportion of the student population from which the sample was recruited had had some experience abroad. Given their background, it is possible that their food behaviors may not be representative of Japanese university students as a whole. However, a Chi-square analysis revealed no significant difference across the clusters in the

proportion of those who had lived abroad ($\chi 2=2.830$, df=6, p=.859; Fisher's exact test, $p=.754$), suggesting that overseas experience may not have played a role in the results. This may have been because, as several participants in the preliminary interviews had mentioned, even while they lived abroad, the students' diets were primarily Japanese. With regard to sample size, in factor analysis, a large sample size is necessary to ensure that the results can not be attributed simply to sampling error (Nunnally & Bernstein, 1994). An adequate sample size is also necessary to ensure that one has the power necessary to detect the anticipated effect. Thus, in the future it would be useful to administer the FCQ to a larger sample to confirm and also extend the findings obtained in this study.

Though certain items in the FCQ, particularly those in the health and content factors, were related to nutritional concepts, there was no explicit measure of subjects' nutritional knowledge. Thus, questions arise regarding the nature of individuals' views of "healthy eating habits" and "nutritious content." For example, both Cluster 2, Weight Conscious, and Cluster 5, Experience and Health-Oriented, considered health important to various degrees. However, was what they considered "health" the same thing? A variety of different criteria for health might exist: maintenance of a certain body weight; consumption of a certain proportion of grains, vegetables, fish and meat, milk and fruits, as recommended by the national nutritional guidelines, "Japanese Food Guide Spinning Top" (Melby et al., 2008); or selection of dishes reflecting the five natural elements, a concept derived from Traditional Chinese Medicine which has also been incorporated into traditional Japanese concepts of food and food preparation (Tsuchiya, 1985). Individuals who rate health or content highly might select very different foods, depending on their conceptions of health and nutrition. Thus, further research concerning the health and

dietary beliefs of young people, and how these might correlate with food choice motivations, would also be helpful for designing nutrition education programs.

Lastly, the instrument used to assess usage and trust of health information sources was an aspect of this study that could be improved. Given the disparate nature of the sources, it may have been difficult for subjects to compare the amount of information each source offers relative to the others. However, the instrument seemed to provide consistent results that fit with extant knowledge concerning information use and trust. Perhaps the part of the instrument that requires the most consideration is the separation of Internet use into two separate variables – access via computer and access via mobile phone. While it may be useful to gain an understanding of the relative amounts that these two channels are utilized, asking subjects to rate them separately might result in lower ratings for both, and a representation for Internet as a whole as a weaker information source than was actually the case. It may be useful to list the Internet as a single information source, and then ask a separate question about the relative frequencies of access via personal computer and mobile phone.

Conclusion

Though previous studies have examined various aspects of food choice and eating habits among young Japanese, their health information behaviors are a subject that has received scant attention. In addition to exploring this connection, this study employed factor analysis in conjunction with cluster analysis to render a picture of multiple groups with different food choice motivations within a limited sample of university students. Such a segmentation technique, though common in marketing, has yet to be applied to this demographic group to understand their health and nutrition behaviors from a psychosocial perspective. This study facilitated a richer profile of individuals' food behaviors – being able to understand not just the one aspect of food choice motivations, but also which food motivations often appear together in the same individual, and how these may be related to demographic characteristics, eating behaviors and information-related behaviors. The question that remains to be addressed is how to employ this information to improve the health and well-being of young people in Japan.

Implications for Nutrition and Health Promotion

The findings of this study indicate that, though Japanese university students exhibit various healthful eating practices, there are also aspects of their diet that could be improved. Though the majority of the students ate three meals a day and breakfast daily, a relatively high percentage also snacked two or more times a day (38.8%). Sixty-three percent of the sample indicated that they had vegetables two or more times a day, but thirty-seven percent consumed them once a day or less often, which might not meet the guideline of

350 g a day set through Health Japan 21 (The Japan Dietetic Association, 2010; Udagawa, Miyoshi & Yoshiike, 2008).

On the whole, the students were concerned about their own health, as 97% of the sample indicated a level of 3 or above on a 5-point scale. However, their scores on the FCQ perhaps reflect the conflicting interests that they attempted to satisfy on a day-to-day basis. In terms of food choice motivations, the sample indicated that they cared most about health, price and convenience – a combination of factors which may often oppose one another.

It is encouraging to note that the majority of students indicated that they were concerned about their health, and many also desired to improve their diets. However, few actively searched for health-related information (only 27% indicated that they had previously performed searches on health- or nutrition-related topics). Thus, it is likely that most of their health- and nutrition-related knowledge is unintentionally learned through their environment and habitual media consumption. In fact, the questionnaire responses support this inference, as respondents rated parents (M=3.91), television (M=3.69) and friends (M=3.40) as the sources from which they obtained the greatest amount of health- and nutrition-related information. Aside from the above sources, magazines and the Internet (accessed via personal computers) were the most utilized, with means of 3.14 and 2.85, respectively.

These information use patterns have various implications for health promotion. As traditional sources of health information, such as parents, peers, television and print media, continue to be the greatest sources of health- and nutrition-related information for university students, nutrition education programs should continue to be developed

utilizing these channels. However, the preliminary interviews conducted in this study suggest that, in the future, use of the Internet as a health information source is likely to increase. The students that were interviewed often utilized the Internet, through both personal computers as well as mobile phones. With regard to mobile devices, uses included an iPhone applet for weight control and viewing recipes available on Cookpad. Thus, with regard to information dissemination, it would be beneficial to continue traditional strategies such as community and school education programs, but also consider novel ways to take advantage of the Internet as a conduit for health information.

Aside from these general recommendations, the findings of this study also have implications for targeted interventions. For example, those who live alone do not have anyone at home to help with groceries and preparing meals. They have a desire to change their eating habits, but perhaps do not know how. The popularity of the site, Cookpad, among the participants in this study, suggests a possible approach to this problem. When young people first move out on their own, there may perhaps be a great deal they need to learn about taking care of themselves, including learning how to cook. As young people are already going online to find information about meal preparation, this would be an ideal point to present nutritional and dietary information. If information could be "served" to this population at their point of need, there is a much greater chance of its being seen and incorporated into their daily lives. Moreover, a recipe site that supports access through both computers and mobile devices might facilitate the dissemination of information to groups that do not utilize traditional print media.

This study also identified concern about weight control as a subject for future research and targeted intervention design. In Cluster 2, which was comprised almost entirely of

women, almost all members had previous diet experience and/or had a desire to lose weight. However, the BMI of this group did not differ significantly from the others; in fact, the average BMI of all groups was within the normal range according to the WHO classification (WHO expert consultation, 2004). These results corroborate previous literature, which has found that young Japanese women tend to perceive themselves as being overweight when in fact their BMI is within the normal range. Perhaps of particular interest is that Cluster 2 scored significantly lower than all other clusters except Cluster 1 in terms of concern for content. Future work could explore the nutritional beliefs of those who are concerned with their weight, and what role information may play in the formation of these beliefs. A more comprehensive model of the interaction between psychosocial motivations, nutritional knowledge, information and lifestyle might then be useful in the design of future interventions.

Lastly, the findings of this study generated a brief list of health- and nutrition-related topics with which students are concerned – topics that nutritionists, educators and policymakers may want to consider as they analyze the health and nutritional status of the population. As only about a quarter of the respondents had previously searched for health- or nutrition-related information, this list is not extensive; however, the topics that were mentioned do provide insight into the health- and nutrition-related problems with which young people today are concerned: dieting, meal preparation, nutritional content of meals, maintaining stamina, headaches and allergies. These issues, if not cared for properly, can sow the seeds for lifestyle-related diseases. Headaches and allergies are examples of problems that have perhaps become more prevalent due to people's increasingly harried lifestyles and consumption of unhealthy foods.

Future Directions

This study investigated the connections between food choices and information behaviors, including the health- and nutrition-related topics with which students are concerned, the sources from which they obtain health-related information, and the degree to which they trust these sources. Though the study has answered some questions regarding the amount and extent of individuals' trust of various information sources, exposure to information does not always mean that individuals believe what they are exposed to, nor does trust imply that information is transmitted, received and integrated into an individual's life. For example, an individual might spend more time chatting with friends about dieting, but tend to place more faith in the advice given by parents – or perhaps the opposite is true. Another point that came across in the interviews was that students trusted Western medical practitioners, but they did not seem to come into contact with them often, and even when they did, they did not seem to obtain much health- and nutrition-related advice from them. The survey responses also support this conclusion. Respondents placed the greatest trust in Western medical practitioners, but rated them third-to-last in terms of amount of health information actually obtained. Future studies might explore in greater depth the circumstances in which students come into contact with health information, the heuristics that they use to determine the trustworthiness of the source, and lastly, how this information might affect their health beliefs and in turn influence health and food-related behaviors.

In addition, it would be useful to investigate how young people access online health- and nutrition-related information. What Internet sites might a young person use to find out more about health-related issues? How could Internet resources be delivered to them

in ways that they would readily access and integrate into their lives? An enriched understanding of the ways in which young people relate to different sources of information, and their perceptions of the credibility of these sources, could facilitate the design of nutritional interventions that are more suited to their lifestyles. In order for interventions to be effective, it is imperative that the lifestyles and attitudes of their target population be taken into consideration in the design process.

Students are at a time in life when they are continually facing new opportunities and experiences. Students in this age also have access to new media channels and are absorbing information at a faster pace than ever before. They are constantly trying new things, in the midst of trying to make sense of the world and forge a life for themselves after they finish school. This is the time to use these technologies as vehicles to educate young people how to maintain their health in the years to come.

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Appendix A: Interview Guide (Japanese-English)

最初の会話：
Preliminary conversation:

こんにちは、アニー・チェンです。宜しくお願いします。
Hello, my name is Annie Chen. I am very pleased to meet you.

インタビューの前に研究についての説明が書いてある紙を配ります。
二枚ありますがこの二枚は同じ内容です。
Before we begin, I would like to show you a study fact sheet and go over it with you. There are two copies, one for you to keep and one for you to sign.

一枚は、内容を読んで問題がなければサインして下さい。
もう一枚はお持ち帰り下さい。
Please read it and sign here if you agree.

- 参加者が同意しない場合は、インタビューを終了する。
- 参加者が同意した場合、インタビューを開始する。
- If No, end participant's involvement in the study.
- If Yes, proceed.

インタビューを録音してもよろしいですか？
Is it okay with you if I record our conversation for later analysis?

- 参加者が同意しない場合は録音機をつけずに続ける。
- 参加者が同意した場合、録音機をつけて続ける。
- If No, proceed with the interview without turning on the recorder.
- If Yes, turn on the recorder and proceed with the interview.

インタビュー内容：
Interview content:

A. 食事の選択
   Food Choices
   1. 初めに、普段はどんなものを食べているのかを簡単に説明していただけますか？
      Can you tell me about a little bit about what you usually eat?
   2. 普段はどこで食べ物を買っていますか？
      Where do you usually buy food?
      - 何を買っていますか？
      - What do you usually buy?
      - その食べ物を買う理由は何ですか？
      - Why do you usually eat these foods?
      - なぜそこで買い物をするのですか？
      - Is there any particular reason why you go there?
   3. どのぐらいの頻度で外食しますか？
      How often do you eat out?
      - 普段よく行くのはどんな所ですか？

- What kinds of places do you usually go to?
- 普段よく食べるのはどんな物ですか？
- What kinds of food do you eat when you go out?

4. どのくらいの頻度で他の人と食事しますか？
   How often do you eat with other people?
   - 誰と一緒に食事をしていますか？
   - Who do you usually eat with?
5. 毎日食べようとしている物がありますか？それは何ですか？
   Are there certain foods that you try to eat every day?
   - なぜ？（参加者が次の理由を言わなければ、聞いてください：健康、気分、便利さ、見た目、自然な食材、値段、体重管理、馴染みがある、道義的な理由）
   - Why? (If the participant does not touch upon the following reasons, can follow up with probing questions regarding: health, mood, convenience, sensory appeal, natural ingredients, price, weight control, familiarity, and ethical concern)
6. 食べないものはありますか？
   Are there certain foods that you try to avoid?
   - なぜ？
   - Why?
7. 一人暮らしですか？
   Do you live by yourself?
   - はい：自分で料理をしていますか？
   - If yes: Do you cook for yourself?
     - はい：何を作っていますか？
     - If yes: What kinds of foods do you cook?
   - いいえ：誰か食事を用意してくれる人がいますか？
   - If no: Who prepares meals at home?
8. 食事を抜く事がありますか？
   Do you skip meals?

B. 健康に対する関心
   Health Concern

9. Do you think you are careful about what you eat?
   ____さんは自分が食生活に気を付けていると思いますか？
10. 現在の食生活に満足していますか？
    Are you satisfied with your current eating habits?
    - いいえ：何か改善しようとしている事がありますか？
    - If no: Are you trying to change them?
      - いいえ：次の質問
      - If no: go to next question
      - はい：どうやって変えますか？何を目指していますか？
      - If yes: How are you trying to change? What are your goals in making this change?
11. ____さんは、自分の健康に関して気になる事ありますか？
    Do you have any concerns about your health?

C. メディア使用
   Media Use

12. 健康と栄養についての知識は普段どこで手に入れますか？
    Where do you usually get information about health and nutrition?

13. インターネットで健康と栄養についての情報をみますか？
    Do you use the Internet to search for health information?
    - はい：どんなサイトを見ていますか？
    - If yes: What websites do you visit?
14. インターネットで健康と栄養についての情報を検索することがありますか？
    Do you search for health or nutrition-related information on the Internet?
15. 健康と栄養について他の誰かの意見をにしますか？
    Do you ask others for their opinions with regard to health and nutrition-related topics?
    - はい：それは誰ですか？（医者、家族、友人等）
    - If yes: Who do you ask (physicians, family, friends, etc.)?

Appendix B.1: Informed Consent Form (English)

University of North Carolina-Chapel Hill
Consent to Participate in a Research Study
Adult Interview Participants

IRB Study # xxxxxxxx
Consent Form Version Date: xxxxxxx

Title of Study: Food Choice Motivations, Eating Habits, and Media Use among Japanese University Students

Principal Investigator: Annie Chen
UNC-Chapel Hill Department: School of Library and Information Science
Email Address: ***atchen@email.unc.edu***
Faculty Advisor: Barbara Wildemuth, Professor, wildem@ils.unc.edu
Study Contact telephone number: 1-xxx-xxx-xxxx

What are some general things you should know about research studies?
You are being asked to take part in a research study. To join the study is voluntary. You may refuse to join, or you may withdraw your consent to be in the study, for any reason, without penalty.

Research studies are designed to obtain new knowledge. This new information may help people in the future. You may not receive any direct benefit from being in the research study. There also may be risks to being in research studies, though no risks are anticipated for this study.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this research study.

You will be given a copy of this consent form. You should ask the researchers named above, or staff members who may assist them, any questions you have about this study at any time.

What is the purpose of this study?
The purpose of this research study is to learn about the food choice motivations, health concerns and media use of university students in Japan.

How many people will take part in this study?
If you decide to be in this study, you will be one of approximately 15 people in this research study.

What will happen if you take part in the study?
You will be interviewed about your food choice motivations, your health concerns, and use of various media such as television, magazines, newspapers, and the Internet.

How long will the interview last?
The interview will last approximately one hour.

What are the possible benefits from being in this study?
Research is designed to benefit society by gaining new knowledge. This study may benefit society by informing policy decisions related to nutrition and health. You may not benefit personally from being in this research study.

What are the possible risks or discomforts involved from being in this study?
The only known risk is breach of confidentiality. The precautions that will be taken to minimize this risk follow in the section below entitled, "How will your privacy be protected?"

There may be uncommon or previously unknown risks. You should report any problems to the researcher.

How will your privacy be protected?
I will be asking you for your name, phone number, and email address, in order to schedule our interview. This personal information will be stored in a file on a password-protected computer. You will be assigned an ID number, which will also be recorded in this file.

The information you provide in the interview will be stored in a separate password-protected file linked to this ID number. This interview data will also reside on a password-protected computer.

Your contact information will only be used if I need to contact you to ask a follow-up question regarding the data you provided. The personal information will be erased as soon as the study is completed.

Participants *will not* be identified in any report or publication about this study.

The interview data will be audio-taped. The recordings will be kept until the study has been completed and then destroyed. The recordings will be stored in electronic form on a password-protected computer.

If you wish, the recorder may be turned off at any time.

Check the line that best matches your choice:
_____ OK to record me during the study
_____ Not OK to record me during the study

What if you want to stop before your part in the study is complete?
You can withdraw from this study at any time, without penalty. The investigator also has the right to stop your participation at any time. This could be because you have had an unexpected reaction, or have failed to follow instructions, or because the entire study has been stopped.

Will you receive anything for being in this study?
You will be receiving 1,000 yen upon completion of the interview.

Will it cost you anything to be in this study?
You can choose to be interviewed at a nearby coffee shop or on campus. If you choose to be interviewed at a coffee shop, you will receive 1,000 yen, but I am unable to pay for the cost of your food and drink.

Will this affect you, as a university student?

Your participation in the study will not affect your class standing or grades. You will not be offered or receive any special consideration if you take part in this research.

What if you have questions about this study?
You have the right to ask, and have answered, any questions you may have about this research. If you have questions, complaints, concerns, or if a research-related injury occurs, you should contact the researchers listed on the first page of this form.

What if you have questions about your rights as a research participant?
All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject, or if you would like to obtain information or offer input, you may contact the Institutional Review Board at 1-919-966-3113 or by email to IRB_subjects@unc.edu.

- -

Title of Study: Food choice motivations, eating habits, and media use among Japanese university students

Principal Investigator: Annie Chen

Participant's Agreement:

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily agree to participate in this research study.

____ ________________
Signature of Research Participant Date

____
Printed Name of Research Participant

Researcher's Signature:

____ ________________
Signature of Research Team Member Obtaining Consent Date

____
Printed Name of Research Team Member Obtaining Consent

Appendix B.2: Informed Consent Form (Japanese)

ノースカロライナ大学チャペルヒル校
調査参加者の同意書
大人のインタビュー参加者

IRB Study # xxxxxxxx
同意書フォーム版の日付：xxxxxxxxx

日本の大学生の食べ物を選ぶ時の動機、嗜好、メディアの使用についての研究

調査責任者：アニー・チェン
UNC-チャペルヒル校 図書館情報学部
メールアドレス：*atchen@email.unc.edu*
担当教授： バーバラ・ウイルダマス教授
研究の問い合わせ番号： 1-xxx-xxx-xxxx

この調査について知らなければならない一般的なことは何ですか？
あなたにこの調査への参加をお願いしています。調査に参加することはボランティアです。参加することを断ってもかまわないし、調査に同意しなくても何も罰則はありません。

調査は新しい知識を得るために行われます。あなたはこの調査研究から直接恩恵を受けることはありません が、この新しい情報は将来人々に役立つかもしれません。どんな研究にもリスクはつきものですが、この研究に関していえば、参加する事によるリスクはほとんど考えられません。

研究に参加する時は危険があるかも知れませんが、この研究に参加することによる危険は期待されていません。

この研究の詳細は以下に明記されています。この調査研究についての権利を知らせておくことはこの情報を理解するために重要なことです。

この同意書のコピーがあなたに渡されます。この研究について質問があれば、いつでもあなたの手助けをしてくれたスタッフ、もしくは上記に書かれている調査責任者にお問い合わせ下さい。

この研究の目的は何ですか？
この調査研究の目的は日本の大学生の食べ物を選ぶ時の動機、健康に対しての考え、メディアの使用について学ぶことです。

この研究に何人の人が参加しますか？
もしあなたがこの研究に参加すると決めたならば、約１５人の参加者の一人です。

この調査に参加するとしたら何が起きますか？

食べ物を選ぶ時の動機、健康に対しての考え、テレビ、新聞、雑誌もしくはインターネットの中でどのメディアを使うのかについてインタビューされます。

インタビューはどのくらいかかりますか？
約一時間ぐらいです。

この研究で得られる特典は何ですか？
新しい知識を得て社会に貢献できます。この研究によって健康と栄養摂取の改善をもたらす可能性があり、その事によって社会に貢献できるかもしれません。この調査研究から個人的な特典は得られません。

この研究に参加して起こりうる危険性もしくは不安は何ですか？
考えられる危険性の唯一のことは秘密が漏れることです。この危険性を少なくするために注意する点は下の“あなたのプライバシーはどのように守られますか？”というセクションにあります。

普通ではありえなかったり事前にわからない危険性があるかもしれません。問題がある場合は調査者に報告してください。

あなたのプライバシーはどのように守られますか？
インタビューの時間を決めたり為、事前にあなたの名前、電話番号、メールアドレスを尋ねます。この個人情報はコンピューターでパスワードを入れないと開かないファイルに保存されます。あなたに ID 番号が付けられますが、そもれも同じファイルに保存されます。

インタビューで得た情報は ID 番号とつながっている別のパスワードを入れないと開かないファイルに保存されます。このインタビューのデーターもパスワードで保護されているコンピューターに保存されます。

あたなの連絡先は、私があなたに引き続き質問をする場合にのみ使われます。個人情報はこの研究が終わり次第すぐに消去されます。

参加者の身元はこの研究の報告書や出版物の中では明らかにされません。

このインタビューのデーターは録音されます。録音は研究が終わるまで保管されその後破棄されます。録音はパスワードで管理されているコンピュータに電子形式で保存されます。

もしあなたがお望みならば、いつでも録音を止めることができます。

あなたの希望に一番近い選択肢はどれですか。線の上に 0 を書いて下さい。

_____ 調査中録音してもかまいません。
_____ 調査中録音は許可できません。

この調査が終わる前にもしあなたがやめたくなった場合はどうしたらいいですか？
この調査をいつでも罰則なく断ることができます。調査者もまたいつでも参加者に対して断る権利があります。例えばあなたが予期しない反応を示したり、指示に従わなかったり、この調査自体が中止になることがあるからです。

この調査に参加して受け取れるものがありますか？
このインタビュー終了後、１０００円を差し上げます。

この研究に参加する事によって大学生として何らかの影響を受ける事がありますか？
あなたの大学生としてのクラスやグレードに何ら影響を与える事はありません。このインタビューを受ける事によってあなたへの特別な報酬や申し出もありません。

この調査でお金がかかることがありますか？
インタビューをするためにあなたは近くの喫茶店もしくはキャンパスを選ぶことができます。もし喫茶店を選んだ場合、１０００円はお支払いしますが、喫茶店での飲食代はお払いできません。

この調査に質問がある場合はどうしたらいいですか？
あなたには質問する権利があり、その質問に対する回答を受け取る権利もあります。もし質問、苦情、心配事、もしくはこの調査によって生じた怪我などがあれば、この書類の最初のページにある調査責任者に連絡をして下さい。

調査参加者としての権利についての質問はどうすればよいですか？
ボランティアで調査参加する場合の調査全てについてあなたの権利と福利は調査委員会によって守られています。調査に対してあなたの権利についてのお考え、質問がある場合、もしくは知りたいことや、付け足したい事がある場合は調査機関委員会にお申し出下さい。電話番号、1-919-966-3113 もしくはメールアドレス IRB_subjects@unc.edu にご連絡下さい。

- -

研究のタイトル: 日本の大学生の食べ物を選ぶ時の動機、嗜好、メディアの使用について

調査責任者：アニー・チェン

参加者の同意文:

私は上記に書かれている事を読みました。その時私が疑問に思っていることは全て尋ねました。この調査研究にボランティアで参加することに同意いたします。

_____ _____
この調査への参加者のサイン　　日付

_____
この調査への参加者のお名前

調査者のサイン

_____ _____

この同意書を受け取る研究チームの人のサイン　　日付

_____

この同意書を受け取る研究チームの人の名前

Appendix C.1: Questionnaire Fact Sheet (English)

Food Choice Motivations, Eating Habits, and Media Use
among Japanese University Students

Dear student:

The purpose of the study is to further knowledge about how people choose what they eat, what their eating habits are, and which media, such as television, newspapers, magazines, and the Internet, that they use to obtain health-related information. It is my hope that the information to be gained from the study will be useful in the future for finding ways to improve the diet and nutrition of young people in Japan.

Your participation in this study is completely voluntary. To participate in the study you will complete the enclosed questionnaire and insert it in the envelope provided. Returning your completed questionnaire implies your consent to be a participant in this study. This questionnaire is composed of questions addressing your food choice motivations, health concerns, and use of various media such as television, newspapers, magazines, and the Internet. Completion of the questionnaire should take no longer than 20 minutes. You are free to answer or not answer any particular question and have no obligation to complete answering the questions once you begin. If you are not interested in participating in this study, please hold onto the blank questionnaire and place it in the envelope provided by the professor at the end of the allotted time.

Your participation is anonymous. You are asked not to put any identifying information on the questionnaire. All data obtained in this study will be reported as group data. No individual can be or will be identified. The only persons who will have access to this data are the investigators named in this letter and the person collecting and mailing the completed forms to the investigators.

Should you participate in this study, there are neither risks anticipated nor any anticipated benefits from being involved with it. There is no cost to you or financial benefit for your participation.

Your participation in the study will not affect your class standing or grades. You will not be offered or receive any special consideration if you take part in this research.

You may contact me with any questions at 1-xxx-xxx-xxxx or by email (atchen@email.unc.edu).

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 1-919-966-3113 or by email to IRB_subjects@unc.edu.

Thank you for considering participation in this study. We hope that the information you provide us can be helpful in extending knowledge about people's food choices.

Sincerely,

Annie Chen
M.S. Candidate

Barbara Wildemuth
Professor

Appendix C.2 Questionnaire Fact Sheet (Japanese)

日本の大学生の食べ物を選ぶ時の動機、食生活、メディアの使用について

学生の皆様へ

この研究の目的は人はどのように食べ物を選ぶのか、食事の好み、また健康に関する情報を得るために、テレビ、新聞、雑誌もしくはインターネットの中で、どのメディアを使うのかを知るためのものです。この研究から得られる情報により日本の若者の食事と栄養の改善方法を見つけ出すために役立つことを期待しております。

この調査への参加はあなたの自由意志によるものです。この調査に参加していただくために同封したアンケートに答えて規定の封筒に入れて下さい。アンケートに答えて送り返すということはこの調査に参加することにあなたが同意したとみなされます。このアンケートは食べ物の選び方、健康に関する考え、テレビ、新聞、雑誌もしくはインターネットなどのメディアの使用についての質問から構成されています。アンケートに答えるのに３０分以上はかかりません。自由に答えたり、ある質問には答えなくても構いませんし、一度は開始したら、質問全部に答えようとする必要もありません。アンケートに答えたくない場合はそのまま持っていて、記入時間終了後に回収用の封筒に入れて下さい。

あなたの参加は匿名になっています。アンケートにはあなただとわかる情報について書くところはありません。この調査で得たデーターは全てグループのデーターとして報告されます。個人の身元が明らかにされることはありません。このデーターを取り扱うことができる唯一の人はこの手紙にある調査者と調査者にフォームを送ったり回収したりする人のみです。

この調査に参加することにより予想される危険や利益はありません。参加することへのお金もかかりませんが、金銭的利益もありません。

あなたの大学生としてのクラスやグレードに何ら影響を与える事はありません。このインタビューを受ける事によってあなたへの特別な報酬や申し出もありません。

質問がありましたら、1-xxx-xxx-xxxx にお電話もしくはメール（atchen@email.unc.edu）をお送り下さい。

ボランティアで調査参加する場合の調査全てはあなたの権利と福利は調査委員会で調べて守られています。調査に対してあなたの権利についてのお考え、質問がある場合、もしくは知りたいことや、付け足したいお考えがあるならば、調査機関委員会にお申し出下さい。電話番号 1-919-966-3113 もしくはメールアドレス IRB_subjects@unc.edu にご連絡下さい。

この調査に参加をお考えいただきありがとうございます。あなたがお答えになったことが人々の食べ物の選択についてより発展した知識となることに役立つ事を期待しております。

アニー・チェン、修士在学中　　バーバラ・ウイルダマス、教授

Appendix D.1: Questionnaire (English)

Food Choice Motivations, Eating Habits and Media Use Questionnaire

1. It is important that the food I eat on a typical day:

	not at all important ←----------→ very important				
Is easy to prepare	☐	☐	☐	☐	☐
Contains no additives	☐	☐	☐	☐	☐
Is low in calories	☐	☐	☐	☐	☐
Tastes good	☐	☐	☐	☐	☐
Contains natural ingredients	☐	☐	☐	☐	☐
Is not expensive	☐	☐	☐	☐	☐
Is low in fat	☐	☐	☐	☐	☐
Is familiar	☐	☐	☐	☐	☐
Is high in fiber and roughage	☐	☐	☐	☐	☐
Is nutritious	☐	☐	☐	☐	☐
Is easily available in shops and supermarkets	☐	☐	☐	☐	☐
Is good value for the money	☐	☐	☐	☐	☐
Cheers me up	☐	☐	☐	☐	☐
Smells nice	☐	☐	☐	☐	☐
Can be cooked very simply	☐	☐	☐	☐	☐
Helps me cope with stress	☐	☐	☐	☐	☐
Helps me control my weight	☐	☐	☐	☐	☐
Has a pleasant texture	☐	☐	☐	☐	☐
Is packaged in an environmentally friendly way	☐	☐	☐	☐	☐
Comes from countries I approve of politically	☐	☐	☐	☐	☐
Is like the food I ate when I was a child	☐	☐	☐	☐	☐
Contains a lot of vitamins and minerals	☐	☐	☐	☐	☐
Contains no artificial ingredients	☐	☐	☐	☐	☐
Keeps me awake/alert	☐	☐	☐	☐	☐
Looks nice	☐	☐	☐	☐	☐
Helps me relax	☐	☐	☐	☐	☐
Is high in protein	☐	☐	☐	☐	☐
Takes no time to prepare	☐	☐	☐	☐	☐
Keeps me healthy	☐	☐	☐	☐	☐
Is good for my skin/teeth/hair/nails etc.	☐	☐	☐	☐	☐

	not at all important ←----------→ very important				
Makes me feel good	☐	☐	☐	☐	☐
Has the country of origin clearly marked	☐	☐	☐	☐	☐
Is what I usually eat	☐	☐	☐	☐	☐
Helps me cope with life	☐	☐	☐	☐	☐
Can be bought in shops close to where I live or work	☐	☐	☐	☐	☐
Is cheap	☐	☐	☐	☐	☐
Includes a lot of vegetables	☐	☐	☐	☐	☐
Consists of many dishes	☐	☐	☐	☐	☐
Keeps me full	☐	☐	☐	☐	☐
Consists of colors that look good together	☐	☐	☐	☐	☐

2. How many times a day do you eat meals other than snacks?

☐ One time ☐ Two times ☐ Three times ☐ Four or more times

3. How often do you snack a day?

☐ Almost never ☐ Once ☐ Twice ☐ Three or more times

4. How often do you eat breakfast?

☐ Rarely ☐ Once or twice a week ☐ Three or four times a week ☐ Five or more times a week

5. How often do you eat vegetables?

☐ Less often than once a day ☐ Once a day ☐ Twice a day ☐ Three or more times a day

6. How often do you eat fruits?

☐ Less often than once a day ☐ Once a day ☐ Twice a day ☐ Three or more times a day

7. How often do you eat with friends and family?

☐ Rarely ☐ Once or twice a week ☐ Three or four times a week ☐ Five or more times a week

8. Have you ever been on a diet?

☐ Yes

☐ No

9. Are you currently interested in changing your dietary habits?

☐ Yes (please explain why：
_____)

☐ No

10. Please indicate the amount of health- and nutrition-related information you obtain from the following sources.

	Almost none←----------→A great deal				
Internet (through PC)	☐	☐	☐	☐	☐
Internet (through mobile phone)	☐	☐	☐	☐	☐
Television	☐	☐	☐	☐	☐
Magazines	☐	☐	☐	☐	☐
Newspapers	☐	☐	☐	☐	☐
Books	☐	☐	☐	☐	☐
Western health care practitioners	☐	☐	☐	☐	☐
Acupuncturists, massage therapists, herbalists and other practitioners of alternative medicine	☐	☐	☐	☐	☐
Family	☐	☐	☐	☐	☐
Friends	☐	☐	☐	☐	☐
Other (please specify_____)	☐	☐	☐	☐	☐

11. To what extent do you trust the following sources of health- and nutrition-related information?

	Not at all←----------→A great deal				
Internet (through PC)	☐	☐	☐	☐	☐
Internet (through mobile phone)	☐	☐	☐	☐	☐
Television	☐	☐	☐	☐	☐
Magazines	☐	☐	☐	☐	☐
Newspapers	☐	☐	☐	☐	☐
Books	☐	☐	☐	☐	☐
Western health care practitioners	☐	☐	☐	☐	☐
Acupuncturists, massage therapists, herbalists and other practitioners of alternative medicine	☐	☐	☐	☐	☐
Family	☐	☐	☐	☐	☐
Friends	☐	☐	☐	☐	☐
Other (please specify_____)	☐	☐	☐	☐	☐

12. Have you previously searched for health- and nutrition-related information? Yes->12.1 No->13

12.1 What topic(s) did you search for?

_____

12.2 What resources did you use in your search? Those who used the either the PC or mobile phones to access the Internet, please specify the site(s) and application(s) used.

☐ Internet via PC (Sites accessed:_____)

☐ Internet via mobile phone (Sites: _____
Applications: _____)

☐ Other (please specify:
_____)

13. To what extent are you concerned about health and nutrition?

Not at all←----------→A great deal

☐ ☐ ☐ ☐ ☐

14. Gender

☐ Male ☐ Female

15. Age _____years

16. Height _____cm

17. Weight _____kg

18. Do you have a part-time job?

☐ Yes（____hrs. per week）

☐ No

19. Do you exercise regularly?

☐ Yes（____hrs. per week）

☐ No

20. Do you cook at home?

☐ Yes

☐ No

21. Have you lived overseas? Yes->21.a No->22

21.a Where have you lived other than Japan? _____
_____

21.b Total years lived abroad _____years

22. Do you live with others? (Please select all applicable responses.）

- ☐ I live alone.
- ☐ I live in a dormitory.
- ☐ I live with friends.
- ☐ I live with my parent(s).
- ☐ I live with siblings.
- ☐ I live with my spouse.
- ☐ I live with family members other than those mentioned above.
- ☐ Other（please specify_____）。

Appendix D.2 Questionnaire (Japanese)

食べ物の選択、食生活やメディアの使用に関するアンケート

1. 普段の一日の食事に重要だと思うものは：

	全く重要でない←---------→とても重要である				
用意が簡単である	☐	☐	☐	☐	☐
無添加である	☐	☐	☐	☐	☐
低カロリーである	☐	☐	☐	☐	☐
おいしい	☐	☐	☐	☐	☐
自然のままの食材が使われている	☐	☐	☐	☐	☐
価額が高くない	☐	☐	☐	☐	☐
低脂肪である	☐	☐	☐	☐	☐
馴染みがある	☐	☐	☐	☐	☐
食物繊維が多く含まれている	☐	☐	☐	☐	☐
栄養価が高い	☐	☐	☐	☐	☐
お店やスーパーで手軽に手に入る	☐	☐	☐	☐	☐
値段に見合う価値がある	☐	☐	☐	☐	☐
気持ちの上で元気になる	☐	☐	☐	☐	☐
香りが良い	☐	☐	☐	☐	☐
調理がとても簡単である	☐	☐	☐	☐	☐
ストレスの解消ができる	☐	☐	☐	☐	☐
体重をコントロールできる	☐	☐	☐	☐	☐
食感が良い	☐	☐	☐	☐	☐
環境に優しいパッケージ	☐	☐	☐	☐	☐
政治的に賛同している国から輸入している	☐	☐	☐	☐	☐
子供の頃から食べているようなものである	☐	☐	☐	☐	☐
ビタミンやミネラルが豊富である	☐	☐	☐	☐	☐
人工的な物質が入っていない	☐	☐	☐	☐	☐
目覚まし効果がある	☐	☐	☐	☐	☐
見た目がきれい	☐	☐	☐	☐	☐
落ち着くことができる	☐	☐	☐	☐	☐
たんぱく質が多く含まれている	☐	☐	☐	☐	☐
準備するのに時間がかからない	☐	☐	☐	☐	☐

	全く重要でない←----------→とても重要である				
健康に良い	☐	☐	☐	☐	☐
肌や歯、髪、爪などに良い	☐	☐	☐	☐	☐
気分がよくなる	☐	☐	☐	☐	☐
原産国が明らかである	☐	☐	☐	☐	☐
普段食べているものだ	☐	☐	☐	☐	☐
人生に立ち向かうために役立つ	☐	☐	☐	☐	☐
自宅か職場の近くで購入できる	☐	☐	☐	☐	☐
値段が安い	☐	☐	☐	☐	☐
野菜がたっぷり入っている	☐	☐	☐	☐	☐
品目が多い	☐	☐	☐	☐	☐
お腹に溜まるものである	☐	☐	☐	☐	☐
色どりがいい	☐	☐	☐	☐	☐

2. 一日に何回食事をしますか？

☐ 一回 ☐ 二回 ☐ 三回 ☐ 四回以上

3. 間食は一日何回とりますか？

☐ ほとんど食べない ☐ 一回 ☐ 二回 ☐ 三回以上

4. 朝ご飯を食べますか？

☐ ほとんど食べない ☐ 週に 1-2 日食べる ☐ 週に 3-4 日食べる ☐ 週に 5 日以上食べる

5. 野菜を食べますか？

☐ 一日一回未満 ☐ 一日一回 ☐ 一日二回 ☐ 一日三回以上

6. 果物を食べますか？

☐ 一日一回未満 ☐ 一日一回 ☐ 一日二回 ☐ 一日三回以上

7. 他の人と一緒に食事をとるのは週に何回くらいですか？

☐ ほとんど一緒に食べない ☐ 週に 1-2 回 ☐ 週に 3-4 回 ☐ 週に五回以上

8. あなたはダイエットをしたことがありますか？

☐ はい

☐ いいえ

9. あなたは今の食生活を変えたいと思いますか？

☐ はい(理由を教えてください：
_____)

☐ いいえ

10. あなたは健康や栄養に関する情報を以下の情報源の中から、どの程度得ていますか？

	ほとんどない←----------→とても多い				
インターネット（パソコンで見る）	☐	☐	☐	☐	☐
インターネット（携帯で見る）	☐	☐	☐	☐	☐
テレビ	☐	☐	☐	☐	☐
雑誌	☐	☐	☐	☐	☐
新聞	☐	☐	☐	☐	☐
本	☐	☐	☐	☐	☐
医療関係者	☐	☐	☐	☐	☐
鍼灸マッサージや漢方薬等、東洋医学従事者	☐	☐	☐	☐	☐
家族	☐	☐	☐	☐	☐
友人	☐	☐	☐	☐	☐
その他（具体的に_____）	☐	☐	☐	☐	☐

11. 健康と栄養に関する情報源としてどのぐらい信頼していますか？

	全く信頼できない←----------→とても信頼できる				
インターネット（パソコンで見る）	☐	☐	☐	☐	☐
インターネット（携帯で見る）	☐	☐	☐	☐	☐
テレビ	☐	☐	☐	☐	☐
雑誌	☐	☐	☐	☐	☐
新聞	☐	☐	☐	☐	☐
本	☐	☐	☐	☐	☐
医療関係者	☐	☐	☐	☐	☐
鍼灸マッサージや漢方薬等、東洋医学従事者	☐	☐	☐	☐	☐
家族	☐	☐	☐	☐	☐
友人	☐	☐	☐	☐	☐
その他（具体的に_____）	☐	☐	☐	☐	☐

12. 健康や栄養に関する特定の情報を探したことがありますか？YES→12.1 へ NO→13 へ
12.1　どんな情報を探しましたか？

_____

12.2　どんな情報源を活用しましたか？　パソコンのインターネットの場合は利用サイト、ケータイのインターネットの場合は利用サイトと利用アプリを記入してください。

☐ パソコンのインターネット（利用サイト：
_____）

☐ ケータイのインターネット（利用サイト：_____、
利用アプリ：_____）

☐ その他（具体的に_____）

13. 健康と栄養について、あなたはどのぐらい関心を持っていますか？
全く関心ない←----------→とても関心がある
☐　☐　☐　☐　☐

14. 性別
☐ 男　☐ 女

15. 年齢　_____才

16. 身長　_____cm

17. 体重　_____kg

18. アルバイトをしていますか？
☐　はい（週に____時間）
☐　いいえ

19. 普段は運動をしますか？
☐　はい（週に____時間）
☐　いいえ

20. 家では自分で調理をしますか？
☐　はい
☐　いいえ

21. 日本以外の国に住んだことがありますか？ YES→21.a へ　NO→Q22 へ
21.a　住んだことのある国名をご記入ください

_____

21.b　居住期間はどのくらいですか？　_____年と_____カ月

22. 同居人はいますか？（当てはまるをすべて選んでください。）

- ☐ 一人暮らし
- ☐ 寮に住んでいます。
- ☐ 友達と一緒に住んでいます。
- ☐ 親と一緒に住んでいます。
- ☐ 兄弟と一緒に住んでいます。
- ☐ 配偶者と一緒に住んでいます。
- ☐ その他の家族と一緒に住んでいます。
- ☐ その他（具体的に_____）。

Appendix E: The Original Food Choice Questionnaire

It is important to me that the food I eat on a typical day:

Factor 1 Health
22 Contains a lot of vitamins and minerals
29 Keeps me healthy
10 Is nutritious
27 Is high in protein
30 Is good for my skin/teeth/hair/nails etc
9 Is high in fibre and roughage

Factor 2 Mood
16 Helps me cope with stress
34 Helps me to cope with life
26 Helps me relax
24 Keeps me awake/alert
13 Cheers me up
31 Makes me feel good

Factor 3 Convenience
1 Is easy to prepare
15 Can be cooked very simply
28 Takes no time to prepare
35 Can be bought in shops close to where I live or work
11 Is easily available in shops and supermarkets

Factor 4 Sensory Appeal
14 Smells nice
25 Looks nice
18 Has a pleasant texture
4 Tastes good

Factor 5 Natural Content
2 Contains no additives
5 Contains natural ingredients
23 Contains no artificial ingredients

Factor 6 Price
6 Is not expensive
36 Is cheap
12 Is good value for the money

Factor 7 Weight Control

3 Is low in calories
17 Helps me control my weight
7 Is low in fact

Factor 8 Familiarity

33 Is what I usually eat
8 Is familiar
21 Is like the food I ate when I was a child

Factor 9 Ethical Concern

20 Comes from countries I approve of politically
32 Has the country of origin clearly marked
19 Is packaged in an environmentally friendly way

Note: The Food Choice Questionnaire developed by Steptoe, Pollard and Wardle (1995).

Appendix F: FCQ Descriptive Statistics

		Mean	SD	Skewness	Kurtosis
1	Is easy to prepare	3.74	.976	-.578	-.119
2	Contains no additives	3.24	1.031	.127	-.861
3	Is low in calories	3.41	1.076	-.249	-.715
4	Tastes good	4.71	.743	-3.569	14.460
5	Contains natural ingredients	3.62	.899	-.027	-.771
6	Is not expensive	3.93	.935	-.570	-.223
7	Is low in fat	3.29	1.115	-.295	-.596
8	Is familiar	3.36	1.044	-.443	-.017
9	Is high in fiber and roughage	3.39	1.067	-.407	-.263
10	Is nutritious	3.96	.974	-.540	-.778
11	Is easily available in shops and supermarkets	3.93	.888	-.541	-.017
12	Is good value for the money	4.13	.794	-.544	-.346
13	Cheers me up	4.05	1.007	-1.082	.819
14	Smells nice	3.71	1.001	-.700	.268
15	Can be cooked very simply	3.74	.939	-.289	-.779
16	Helps me cope with stress	3.49	1.047	-.355	-.470
17	Helps me control my weight	3.42	1.131	-.340	-.712
18	Has a pleasant texture	3.58	.949	-.237	-.565
19	Is packaged in an environmentally friendly way	2.76	1.053	.271	-.297
20	Comes from countries I approve of politically	2.42	1.169	.479	-.422
21	Is like the food I ate when I was a child	3.16	1.122	-.066	-.596
22	Contains a lot of vitamins and minerals	3.95	.927	-.690	.038
23	Contains no artificial ingredients	3.50	.935	.075	-.850
24	Keeps me awake/alert	2.54	1.046	.292	-.488
25	Looks nice	3.53	.988	-.412	-.502
26	Helps me relax	3.42	1.061	-.335	-.307
27	Is high in protein	3.28	.990	-.053	-.333
28	Takes no time to prepare	3.85	.912	-.330	-.744
29	Keeps me healthy	4.37	.772	-1.087	.664
30	Is good for my skin/teeth/hair/nails etc.	3.72	.999	-.726	.097
31	Makes me feel good	3.87	.943	-.493	-.335
32	Has the country of origin clearly marked	3.51	1.142	-.333	-.755
33	Is what I usually eat	3.62	1.006	-.682	.292
34	Helps me cope with life	2.89	1.175	.154	-.700

		Mean	SD	Skewness	Kurtosis
35	Can be bought in shops close to where I live or work	3.82	.935	-.733	.645
36	Is cheap	4.02	.871	-.591	.061
37	Includes a lot of vegetables	4.15	.826	-.948	1.128
38	Consists of many dishes	3.89	.904	-.276	-.871
39	Keeps me full	3.96	.800	-.252	-.680
40	Consists of colors that look good together	3.59	.948	-.509	.086

Appendix G: FCQ Initial Pattern Matrix

	Content	Conve-nience	Appeal	Health	Weight Control	Mood	Famili-arity	Aesthe-tics	Price	Satisfaction	Ethical Concern
5 Nat. ingredients	**.829**	-.043	-.110	.103	-.025	-.024	.203	-.018	.084	.036	.119
10 Nutritious	**.678**	.055	-.170	-.010	-.054	.053	.002	.137	-.155	-.161	.047
2 No additives	**.619**	-.131	.052	.224	-.121	-.171	.115	.174	.059	-.020	.229
23 No artificial…	**.494**	.018	.180	-.097	-.046	.259	-.076	-.043	.140	-.179	.235
9 Fiber	**.362**	.058	.062	.192	.289	.085	.178	-.152	-.134	-.126	-.112
19 Enviro. pack.	**.355**	-.067	.282	.329	-.029	.133	-.087	-.203	-.100	.102	-.049
1 Easy to prepare	.196	**.981**	-.113	-.136	-.105	-.020	-.083	.016	-.017	.097	-.025
15 Simple to cook	-.228	**.731**	.028	.077	.051	-.042	.053	.082	.046	.077	.078
28 No prep. time	.041	**.683**	-.102	.060	.034	.107	.038	.061	.137	-.011	-.027
11 Avail. in shops	-.186	**.460**	.292	.135	-.035	-.028	.166	-.106	-.056	-.074	.063
35 Close to work/home	-.101	**.321**	-.022	.196	-.047	-.028	.277	-.153	.138	-.162	.149
12 Good value	.000	-.059	**.839**	.043	-.104	-.273	.045	-.034	.327	-.014	.004
13 Cheers me up	-.077	-.069	**.691**	-.065	.020	.157	.026	.013	-.115	.196	.041
16 Cope with stress	.039	-.018	**.596**	-.027	-.070	-.034	-.088	.253	-.019	.216	.060
18 Pleasant texture	-.097	-.012	**.538**	-.021	.001	.191	.149	.121	-.023	.038	.032
14 Smells nice	-.001	.077	**.458**	-.081	-.041	.286	-.093	.028	.160	-.092	.006
37 Lots of vegetables	.137	.091	-.189	**.845**	-.002	-.107	-.187	.015	.169	.006	-.038
22 Vitamins & minerals	-.137	.016	.044	**.665**	.151	.012	-.077	.314	-.140	-.147	-.047
30 Good for skin…	.102	-.082	.092	**.647**	-.040	.178	-.084	-.113	-.142	.126	.039
38 Many dishes	.239	-.047	-.024	**.582**	-.054	-.033	-.016	.100	.339	.146	-.023
29 Keeps me healthy	.081	.104	.031	**.484**	.066	.005	-.056	.099	.096	.042	.150

	Content	Conve-nience	Appeal	Health	Weight Control	Mood	Famili-arity	Aesthe-tics	Price	Satisfaction	Ethical Concern
7 Low in fat	.006	-.065	-.241	-.033	**.944**	-.040	.057	.073	.015	.155	.089
3 Low in calories	.079	-.007	.008	.098	**.838**	-.072	-.073	.032	.069	-.079	.041
17 Control weight	-.188	.007	.051	.008	**.805**	.042	-.060	-.030	.015	.080	.087
26 Helps me relax	-.028	.075	-.119	.188	-.116	**.781**	-.007	-.182	-.065	.067	-.039
34 Cope with life	.016	-.192	.178	-.209	.112	**.614**	.062	.101	.198	-.030	.041
31 Makes me feel good	.100	.083	-.053	-.146	.063	**.491**	.097	.143	.131	.074	-.114
27 High in protein	-.134	-.070	.277	.205	-.132	**.408**	.044	.219	-.035	-.019	.038
24 Awake/alert	.225	.103	-.014	.220	.050	**.406**	-.002	.180	-.063	-.047	-.072
8 Is familiar	.160	.003	.261	-.133	.074	-.141	**.840**	.014	-.037	.015	-.327
33 Is what I usually eat	.172	-.021	-.064	-.185	-.070	.170	**.672**	.012	-.031	.134	.098
21 Food from childhood	-.023	.158	-.132	-.108	-.060	.082	**.666**	.163	-.067	.043	.109
25 Looks nice	.043	.014	.221	.043	.066	-.026	.029	**.823**	-.049	-.170	-.078
40 Colors look good	.073	.038	-.024	.166	-.019	.067	.122	**.607**	-.032	.127	-.080
36 Cheap	-.075	.035	.019	.171	.019	.064	-.016	-.064	**.840**	.104	-.099
6 Is not expensive	.009	.196	.267	-.079	.082	.089	-.122	-.012	**.648**	.073	-.174
39 Keeps me full	-.199	-.043	.011	.155	.104	.170	.221	-.127	.237	**.714**	.021
4 Tastes good	.027	.190	.545	-.071	.053	-.151	-.086	.066	-.074	**.567**	.102
20 Approve politically	.336	.110	.131	-.135	.225	.014	-.100	-.191	-.057	-.076	**.620**
32 Country marked	.274	-.017	.055	.122	.040	-.112	.060	-.010	-.249	.169	**.613**

Appendix H: Pattern Matrix of the Revised 27-Item FCQ

	Consump-tion Exp.	Conveni-ence	Health	Weight Control	Natural Content	Familiarity	Price
16 Cope w. stress	**.855**	.061	-.106	-.016	.106	-.171	-.036
31 Makes me feel good	**.694**	.014	-.049	-.107	.144	-.153	.060
13 Cheers me up	**.690**	.080	.005	-.010	-.042	.077	.010
25 Looks nice	**.587**	-.091	.287	-.141	-.118	.120	.029
26 Helps me relax	**.521**	-.006	.084	.088	-.058	.151	-.120
14 Smells nice	**.510**	-.179	-.046	.149	-.042	.166	.171
15 Simple to cook	-.103	**.887**	-.110	-.058	.160	-.067	-.057
1 Easy prep.	.037	**.791**	.063	.026	-.180	.029	-.004
28 No prep. time	.019	**.713**	.046	.062	.068	.049	.057
11 Avail. shops	.123	**.524**	.131	-.043	-.092	.109	-.002
35 Close to work/home	-.069	**.415**	.169	-.057	-.061	.180	.130
30 Good for skin	-.230	.123	**.774**	.004	.133	-.184	.084
37 Vegetables	.144	.009	**.688**	.141	-.182	.008	-.178
29 Healthy	.130	-.060	**.638**	-.041	.193	-.060	-.105
22 Vita. & mineral	.047	.096	**.577**	.059	.074	.015	.066
38 Many dishes	-.023	.009	**.555**	-.025	.172	-.024	.205
7 Low in fat	-.150	-.084	-.009	**.892**	.047	.092	-.027
3 Low in calories	.048	.038	.079	**.832**	.108	-.096	.025
17 Control weight	.056	.025	.031	**.737**	-.091	-.056	.030
5 Nat. ingredient	-.034	-.045	.116	.041	**.807**	.183	.089
23 No artificial…	.047	.068	.040	.058	**.569**	-.014	-.259
2 No additives	.135	-.073	.321	-.083	**.540**	.058	-.049
33 What I usu. eat	-.114	.136	.008	-.030	-.061	**.807**	-.070
21 Food from childhood	-.001	-.049	-.092	-.053	.171	**.780**	.024
8 Familiar	.191	.127	-.218	.082	.170	**.540**	.012
36 Cheap	-.086	-.037	.125	-.033	-.127	.044	**.955**
6 Not expensive	.231	.207	-.146	.091	-.018	-.127	**.639**

Appendix I: Agglomeration Schedule

Iteration	Coefficient	Chg. in Coeff.
97	4.816	0.181
98	4.997	0.277
99	5.273	0.297
100	5.571	0.010
101	5.580	0.325
102	5.905	0.257
103	6.162	0.139
104	6.301	0.222
105	6.523	0.140
106	6.663	0.304
107	6.967	0.284
108	7.251	0.213
109	7.464	0.182
110	7.645	0.623
111	8.268	0.232
112	8.500	0.802
113	9.302	0.689
114	9.991	2.080
115	12.071	

Note: Only the last twenty steps are shown.

Appendix J: Search Topics

Search Topic	Frequency
dieting information	10
Recipes	6
nutritional and calorie content	3
what various vitamins and minerals do	3
Headaches	2
stamina foods	2
low-calorie foods	2
Allergies	2
foods to eat after weight training	1
Hangovers	1
what drinks go with what foods	1
how much food one should have each day	1
cooking ingredients	1
Yoga	1
foods for specified health uses, such as cholesterol reduction (トクホ)	1
nutritional balance	1
Miso	1
Supplements	1
Acne	1
proper amount of daily exercise	1
black vinegar	1
effect of eating breakfast	1

Note: The above table represents the free-text responses to Question 12.1.