MOTIVATIONS OF EVERYDAY FOOD CHOICES

by

XUAN UYEN PHAN THUY

B.E., Ho Chi Minh City University of Technology, Vietnam, 2004
M.Sc., National Cheng Kung University, Taiwan, 2008

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Human Nutrition
College of Human Ecology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2015

Abstract

Understanding "why people eat what they eat" is important for improving the lives of people around the world by helping provide industrial and social solutions for people so that they may have greater pleasure and health from the foods they choose. The objectives of the research were to investigate motivations behind everyday meals and choices of different food groups using three different approaches incorporating two psychological perspectives: top-down and bottom-up. The first approach was the Eating Motivation Survey (TEMS) targeting the specific choices of foods and beverages people consumed at specific eating events (breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and late-night snack). The second approach was the Food Choice Map (FCM) technique to explore motivations for individual food choices for all eating within a typical week. These two approaches employed the bottom-up process. The last approach used TEMS to investigate food choice directly for six eating occasions, without information about what were eaten specifically. This procedure demonstrated a top-down process because people first thought about their eating as a whole and then read through all TEMS scales to find the motivations that they consider "appropriate" for their answers. The first surveys were completed by 198 participants. The FCM interview was conducted on 100 respondents and the same respondents also participated in the last approach. Data were analyzed by Correspondence Analysis. *Liking* was the strongest motivation that drove people's food choice. In addition, *need and hunger*, *habits*, *price*, and *convenience* were the other main motivations for breakfast, lunch, and dinner while *health* and *weight control* were found to be the main driving factors for mid-morning and mid-afternoon snacking. Late-night snacks were linked to *pleasure* and *visual appeal*. For dinner, people also were motivated most by *variety seeking* and *traditional eating*. Different food groups were also chosen with different motivations. Grain, pasta, meats and

poultry were linked to *convenience*, *variety seeking*, *traditional eating*, and *price* while nuts, seeds, eggs and dairy were associated with *need and hunger*, *health*, and *weight control*. Findings from this project advanced and reinforced the knowledge about food choice and encouraged investigating food choice from different perspectives.

MOTIVATIONS OF EVERYDAY FOOD CHOICES

by

XUAN UYEN PHAN THUY

B.E., Ho Chi Minh City University of Technology, Vietnam, 2004
M.Sc., National Cheng Kung University, Taiwan, 2008

A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Human Nutrition
College of Human Ecology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2015

Approved by:

Major Professor
Edgar Chambers IV

Abstract

Understanding "why people eat what they eat" is important for improving the lives of people around the world by helping provide industrial and social solutions for people so that they may have greater pleasure and health from the foods they choose. The objectives of the research were to investigate motivations behind everyday meals and choices of different food groups using three different approaches incorporating two psychological perspectives: top-down and bottom-up. The first approach was the Eating Motivation Survey (TEMS) targeting the specific choices of foods and beverages people consumed at specific eating events (breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and late-night snack). The second approach was the Food Choice Map (FCM) technique to explore motivations for individual food choices for all eating within a typical week. These two approaches employed the bottom-up process. The last approach used TEMS to investigate food choice directly for six eating occasions, without information about what were eaten specifically. This procedure demonstrated a top-down process because people first thought about their eating as a whole and then read through all TEMS scales to find the motivations that they consider "appropriate" for their answers. The first surveys were completed by 198 participants. The FCM interview was conducted on 100 respondents and the same respondents also participated in the last approach. Data were analyzed by Correspondence Analysis. *Liking* was the strongest motivation that drove people's food choice. In addition, *need and hunger*, *habits*, *price*, and *convenience* were the other main motivations for breakfast, lunch, and dinner while *health* and *weight control* were found to be the main driving factors for mid-morning and mid-afternoon snacking. Late-night snacks were linked to *pleasure* and *visual appeal*. For dinner, people also were motivated most by *variety seeking* and *traditional eating*. Different food groups were also chosen with different motivations. Grain, pasta, meats and

poultry were linked to *convenience*, *variety seeking*, *traditional eating*, and *price* while nuts, seeds, eggs and dairy were associated with *need and hunger*, *health*, and *weight control*. Findings from this project advanced and reinforced the knowledge about food choice and encouraged investigating food choice from different perspectives.

Table of Contents

List of Figures

List of Tables

Acknowledgements

Firstly, I would like to thank to my advisor, Dr. Edgar Chambers IV, for continuously supporting me with my PhD study, for his patience and immense knowledge, and for giving me the guidance needed to be a successful scientist in the field of sensory science.

Besides my advisor, I would like to express my gratitude to all the committee members for their comments and advice on this thesis work. Their inputs helped improve the publications coming from this work.

I also would like to thank all of my fellow lab-mates and technicians for their help with conducting interviews and the data entry process. This work would not have been possible without their outstanding assistance.

Last, but not least, my thanks go to my family: my mom, my grandma, my uncle and my sister for always supporting me even though we are half the earth away. They are always the strength for me to overcome any obstacle in life.

Chapter 1 - Literature Review

Understanding "why people eat what they eat" is a primary concern to people in the food industry whose major interest is in manufacturing and selling successful food products. Food choices are a primary determinant of what and how much food is eaten. From the perspective of economics and commercial interest, simple food consumption surveys can provide basic *economic* information (Rozin, 2007) about people's food choices as it relates to manufacturing. Food choice also determines nutritional status and because diet influences on health and disease, it is essential to understand what is eaten. However, from other perspectives simply understanding *what* is eaten is far less important than understanding *why* those foods are eaten. When we want to create new successful products, change eating behaviors to more sustainable products, or encourage people to eat foods that may be more healthful than current options but not typical in their diet, the processes by which people make their food choices become key. In other words, only with an adequate understanding of the reasons for people's choice of foods can we attempt to change choices and thus influence dietary patterns (Shepherd & Sparks, 1994). A focus on health is especially important when many people in developed countries currently face over-nutrition issues and people throughout the world face issues of under-nutrition. Data from the United States National Health and Nutrition Examination survey showed that 35.1% of adults age 20 years and over were obese in 2011-2012 and a total 69% of adults age 20 years and over were overweight, including obesity. Also, the US Department of Agriculture noted that even in the U.S., which has many poverty and food programs, food insecure households comprised 14.3% of the population in 2013 (USDA, 2014). These situations are closely related to food choices. On a global scale, the World Health Organization (WHO) Fact sheet N˚311 (January 2015) showed that worldwide obesity has more than doubled since 1980. In 2014, more than 1.9

billion adults age 18 or older were overweight and of these 600 million were obese. In contrast, The United Nations World Food Programme reported that nearly 800 million people worldwide were unable to live a healthy active lifestyle because of hunger (United Nations World Food Programme, 2015). In short, understanding food choice can help to provide dietary advice to people as well as facilitate marketing strategies and efforts to improve human and environmental health (Pula, Parks, & Ross, 2014). The World Health Organization suggests that one of the three most important methods for promoting healthy eating is "Encouraging consumer demand for healthy foods and meals" (WHO fact sheet N˚394, March 2015). This can be done in part by providing consumers with alternative products (both manufactured and local) that meet consumer needs. Knowledge of the motivations behind each food group and eating situation can help to facilitate new food product development and better understand marketing (including social marketing for more healthful eating) of these new products. This could help the product developers, marketers, health educators, etc. to work with each other to promote better eating. However, seeking such understandings is not simple due to the complexity of food choice. It requires interdisciplinary researches of the many factors and disciplines involved in food choice behaviors, i.e. biological and physiological factors, psychological factors, situational factors, socio-cultural factors, extrinsic product characteristics and expectations, and intrinsic product characteristics and perception (Köster, 2009). This chapter provides a literature review covering the following topics: (1) food choice and factors influencing food choice, (2) theories and models of food choice, 3) meal context in food choice and (4) measurement methods in food choice.

Food choice and factors influencing food choice

There is a universal agreement that food choice is a very complicated behavior. Research on food choice often provides a partial answer to the central question in food choice research:

"*why* does *who* eat *what*, *when*, and *where*?" (Köster, 2009). According to Rozin (2007), from the perspective of economics, health, and commercial interests, the major question in food choice is "*who* eats *what*, and *how much* of it?" The food choice process incorporates both conscious and habitual, subconscious reflections (Furst, Connors, Bisogni, Sobal, & Falk, 1996) as well as simple frugal heuristics (Schulte-Mecklenbeck, Sohn, de Bellis, Martin, & Hertwig, 2013). The following statement adopted from Sobal, Bisogni, Devine, and Jastran (2006) could serve as a definition of food choice.

> "Food choice involves the selection and consumption of foods and beverages, considering *what*, *how*, *when*, *where* and with *whom* people eat as well as other aspects of their food and eating behaviors".

There are a variety of factors influencing everyday food choice. These factors include biology and physiology, motivation and decision psychology, sociology, economics, consumer science, and perception-, memory-, emotion-, social- and decision psychology (Köster, 2009). Each of these factors target different part of the question "*why* does *who* eat *what*, *when*, and *where*?" For instance, biology (e.g. energy balance), physiology, and motivation and decision psychology each attack the "*why*", while sociology (e.g. culture, tradition), and social psychology target the "*who*". To find the answer for the "*what*" question, economics, consumer science, perception- and memory-, and learning psychology have major contribution. Finally, almost all of these disciplines have answers to the "*where*" and "*when*" questions (Köster, 2009).

In application, Carrillo, Prado-Gascó, Fiszman, and Varela (2012) use personal traits (neuroticism and conscientiousness), food choice motives (health and weight control) and intrinsic personal characteristics such as self-esteem and satisfaction with life to model low-fat, low-sugar and high-calorie food consumption behavior. The authors report weight control is the

best predictor for consumption of this kind of product, but health is not so strong of a predictor. Food choice motives are also reported to mediate the effect of food involvement on intake of specific food categories (Eertmans, Victoir, Vansant, & Van den Bergh, 2005). Eartmeans et al. (2005) also find sensory appeal as a positive predictor for spice intake, while health as positive and natural content as negative predictors for milk consumption. Besides, level of food involvement or food neophobia appears to influence the relation of motives with both food intake and dietary healthfulness.

Bisogni et al. (2007) provide a conceptual framework for understanding of situational nature of eating and drinking as discrete episodes with eight dimensions: food and drinks, time, location, activities, social setting, mental processes, physical conditions, and recurrence (Figure 1.1). Blake, Bisogni, Sobal, Devine, and Jastran (2007) find that depending on the context, foods can be categorized into 12 different categories, i.e. routine, preference, well-being (personal-experience-based types), meal/time, meal component, convenience, location, source, person (context-based types), food group, nutrient composition and physical characteristics (food-based types). Particularly, Blake, Bisogni, Sobal, Jastran, and Devine (2008) discover eight different kinds of scripts or roles including *provider*, *family cook, head of the table*, *egalitarian, struggler*, *just eat, anything goes,* and *entertainer* for an evening meal.

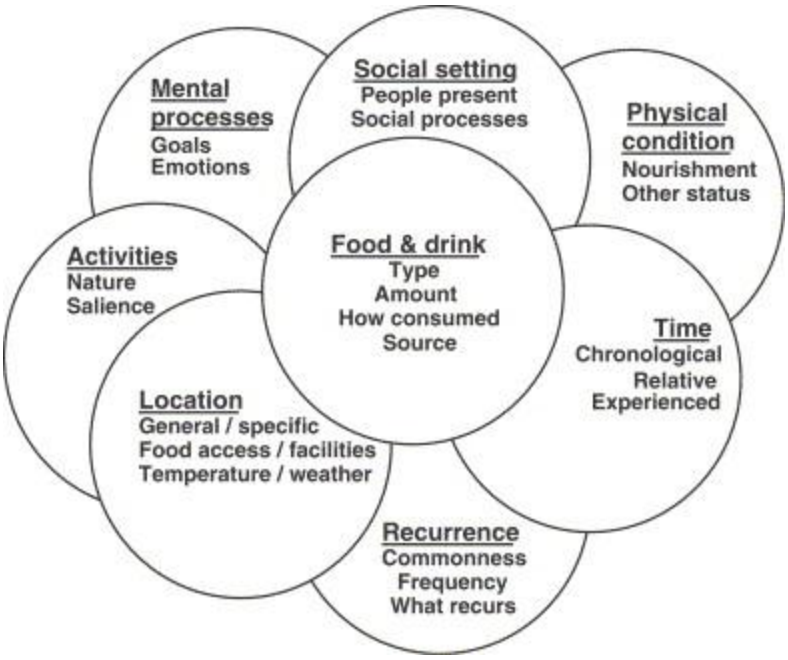


Figure 1.1 The eight interacting dimensions and features of eating and drinking episodes that characterized situational food and beverage consumption among a sample of working adults in the US (adopted from Bisogni et al., 2007, reproduced with the permission of Elsevier Limited, Oxford, UK)

Cultural influence on food choice is the main scope of a number of studies. Prescott, Young, O'Neill, Yau, and Stevens (2002) find that Taiwanese and (ethically Chinese) Malaysian consumers are similar in considering health, natural content, weight control and convenience as the most important food choice factors, whereas it is price for the Japanese, and sensory appeal for the New Zealanders. Sensory appeal, purchase convenience, and health and natural content are found to be the most important motives for food choice of consumers in six Western Balkan Countries; while ethical concern and familiarity are the least important (Milošević, Žeželj, Gorton, & Barjolle, 2012). Pieniak, Verbeke, Vanhonacker, Guerrero, and Hersleth (2009) report that weight control, price, ethical concern, convenience, natural content, health, sensory appeal, and familiarity have the same meaning and similar structural characteristics across cultures in Europe.

Theories and models of food choice

Köster and Mojet (2006) acknowledge the importance of developing models of food choice development due to its dynamic characteristic. Food choice is predominantly a learned behavior and is subject to almost continuous change. Underestimating this varied and dynamic nature of food preference and food choice behavior could result in failure in introducing new products in the market. Modelling food choice, thus, must take into account the knowledge from a range of psychological theories involving perception, learning and memory, motivation and emotion, decision making, cognition, and social behavior.

Motivation theories

Motivation should be understood as constant flow of behavior that can be directed in many different ways (Petri & Govern, 2012). Motivation has to do with the reasons underlying behavior. There are at least two different levels to explore these reasons: *why* an individual exhibits certain behaviors (*ultimate causation*) and *how* these behaviors came about (*proximate causation*) (Wong, 2000). According to Wong, an analysis of behavior in terms of ultimate causation is also regarded as a *functional* explanation, with the assumption that there is something to be gained by behaving that way. Meanwhile, proximate mechanisms which are shaped by natural selection provide an explanation concerning *how* certain activities occur. A motivational analysis of the reasons for sweet preference considers both *ultimate* and *proximate* causal factors (Wong, 2000).

One commonly held characteristic of motivation is its activating properties (Köster & Mojet, 2006; Wong, 2000). This is often seen in the production of behavior (overt responding), i.e. when the observed organism is behaving in certain way. Organisms are believed to actively look for stimulation and try to maintain an optimal level of activation or arousal. The

attractiveness of stimuli (e.g. food items) thus depends on their arousing properties (e.g. intensity, novelty, complexity). It should be at the optimal level of arousal otherwise it will not be preferred (Köster & Mojet, 2006). Since the level of preferred arousal are different from person from person, the same stimulus may be just right for some, but too week or too strong for others. Therefore, theories such as dynamics of liking and preference (Walker, 1980) and mere exposure (Zajonc, 1968) are developed as the result of this characteristic of motivation.

Food neophobia and variety seeking could be approached by motivation theories. Food neophobia is defined as the fear of trying new foods or unfamiliar foods (Henriques, King, & Meiselman, 2009; Marcontell, Laster, & Johnson, 2003; Pliner & Hobden, 1992) and is described as an evolutionarily beneficial survival mechanism to help omnivores avoid getting poison (Dovey, Staples, Gibson, & Halford, 2008). Food neophobia is found to be a learned behavior. It appears at a low baseline at weaning and increases to reach a peak between 2 and 6 years old and then decreases until early adulthood (Dovey et al., 2008; Köster & Mojet, 2006, pp.99). Unfamiliar foods are found to result in different responses between neophilics and neophobics, with neophobics making more negative evaluations (Raudenbush & Frank, 1999). According to Köster and Mojet (2006), the level of perceived complexity of the novel stimuli relative to the optimal complexity has to do with whether a neophobic attitude will express itself in an actual behavior or not. The arousal theories are a good fit for food neophobia behavior.

Variety seeking is a motive in consumer behavior that has recently received considerable interest (Hoyer & Ridgway, 1984; Nicklaus, Boggio, Chabanet, & Issanchou, 2005; Van Trijp & Steenkamp, 1992). The source of variety seeking is the internal need for stimulation and it is also explained by the theories of optimal arousal. According to Hoyer and Ridgway (1984), Menon & Kahn (1995), Van Trijp (1995), and Köster and Mojet (2006), when stimulation (complexity,

arousal, etc.) falls below the ideal level, an individual becomes bored and attempts to produce more stimulating input (via exploration and novelty seeking). As stimulation increases past the ideal level, an individual will attempt to reduce or simplify input. Variety seeking behavior also depends on the type of product involved, with respect to the availability of large variety of that type of product (Van Trijp, 1994).

All theories above are 'descriptive' theories that explain the learning and motivation mechanisms functioning in the development of food choice and rely on mechanisms that mostly function at a non-cognitive level (Köster & Mojet, 2006). More cognitive and social factors, however, should also be discussed in modelling food choice.

Cognitive theories

The theories of reasoned actions and planned behavior (Ajzen & Fishbein, 1980; Ajzen, 1985; Ajzen, 1991; Fishbein & Ajzen, 1975) can be seen as the most prominent theories that are directly concerned with explicit factors and conscious strategies to food choice. The theory of reasoned action states that behavior is determined by behavioral intention, where such intention is a function of 'attitude toward the behavior' and 'subjective norm' (Fishbein & Ajzen, 1975). The theory of planned behavior extends the theory of reasoned action by including a measure of perceived behavioral control as a determinant of both intentions and behavior (Conner & Armitage, 2006). These theories predict intention to perform a behavior by the consumer's attitude toward that behavior rather than by the consumer's attitude toward a product or service (Hansen, Møller Jensen, & Stubbe Solgaard, 2004). Self-report questionnaires or interview technique using 'why-questions' are often the measurement approaches to these attitudes, beliefs and intentions, but often no observation of actual choice is made to validate the results (Köster & Mojet, 2006). Application of these theories in predicting food choice include various studies

such as Armitage and Conner (1999), Berg, Jonsson, and Conner (2000), Armitage and Conner (2001), Bissonnette and Contento (2001), Backman, Haddad, Lee, Johnston, and Hodgkin (2002), Conner, Norman, and Bell (2002), Rah, Hasler, Painter, and Chapman-Novakofski (2004), Arvola et al. (2008), Shah Alam and Mohamed Sayuti (2011), to name a few.

Theories of reasoned actions and planned behavior are based in part in expectancy and value constructs, or Expectancy-Value model of attitude-behavior relationship (Conner & Armitage, 1998; Wigfield, Tonks, & Klauda, 2009). Expectancy-Value theory is based on the assumption that individuals are motivated to maximize the chances of desirable outcomes occurring and minimize the chances of undesirable outcomes occurring (Conner & Armitage, 2006). Expectancy is defined as anticipation for the future, while value is multifaceted and encompasses five formal features: (1) conceptualization of beliefs, (2) expectation of desirable end states or behaviors, (3) application toward future related situations, (4) guidance for selection of behavior, and (5) evaluation of relative importance (Schwartz & Bilsky, 1990; Schwartz, 1992; Schwartz & Bilsky, 1987). However, value is regarded as more of a motivational force and not just a belief because valuing something means wishing to attain it (Wigfield et al., 2009). Modern expectancy-value theories are based in Atkinson's (1964) Expectancy-Value model in that they link achievement performance, persistence, and choice theories most directly to individuals' expectancy-related and task-value beliefs (Eccles & Wigfield, 2002). However, according to Eccles and Wigfield, they possess different properties: (1) both expectancy and value components are linked to a broader array of psychological and social/cultural determinants, and (2) expectancies and values are assumed to be positively related to each other.

Expectancy-Value theory has been used in a number of studies to study consumer behavior. Olsen (2002) applied the expectancy-value theory into modeling the relationship

between perceived quality performance, customer satisfaction, and repurchase loyalty. Aertsens, Verbeke, Mondelaers, and Van Huylenbroeck (2009) confirm the role of the following values as motivators for organic food consumption: security, hedonism, stimulation, universalism, benevolence, self-direction, conformity, and power. Glanz, Basil, Maibach, Goldberg, and Snyder (1998) used a theory called Multiattribute Utility Theory, which is a form of value expectancy theory to understand why Americans eat what they do. The authors argue that "value times expectancy" affects the decision to act, for instance, if a person values the importance of food nutrition and rates a food as highly nutritious, then there is a good chance that she/he will choose to eat it.

Therefore, cognitive theories should be employed in modelling of food choice, especially when measuring methods involving cognitive process such as self-report questionnaires or structured scales.

Modelling food choice

Because food choice plays an important role in symbolic, economic, and social aspects of life by expressing preferences, identities, and cultural meanings, it has gotten much attention from many researchers and practitioners (Sobal et al., 2006). Models and conceptual frameworks have been developed for food choice using many different approaches such as employing models and theories from other fields, especially behavioral and social psychology, or developing new models using qualitative research methods to produce emergent conceptualizations of how people think about and engage in food choices. de Boer, Hoogland, and Boersema (2007) employed Higgins's Regulatory Focus Theory (Higgins, 1998) and Schwartz's theory of basic human values (Schwartz, 1992) to model the relationship between broad universalistic values and food choices. According to Higgins (1998), two distinct motivational systems, termed

promotion and prevention, regulate all goal-directed behaviors. The promotion system underlies approach orientation and the prevention system guides avoidance orientation. The promotion system's hedonic concerns relate to the pleasurable presence of positive outcomes (i.e. gains) and the painful absence of positive outcomes (i.e. non-gains), while the prevention system's hedonic concerns relate to the pleasurable absence of negative outcomes (e.g. non-losses) and the painful presence of negative outcomes (e.g. losses) (Higgins et al., 2001). In the model proposed by de Boer and his colleagues (Figure 1.2), the promotion-oriented and prevention-oriented motives shape food choices directly as well as indirectly through motive-congruent attitudes.

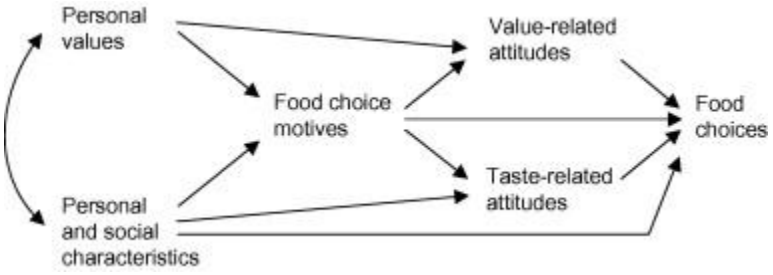


Figure 1.2 The conceptual model of food choice (adopted from de Boer et al., 2007; reproduced with the permission of Elsevier Limited, Oxford, UK)

The above model is an example of the approach using existing theories and models from social psychology to modelling food choice. Figure 1.3 shows a model of food choice process over the life course reported by Sobal et al. (2006). This model is an adaptation of an inductively developed and evolving model of the food choice process devised using in-depth qualitative interviews with adults in the USA that asked about how they constructed their food choices (Falk et al., 1996; Furst et al., 1996; Conners et al., 2001).

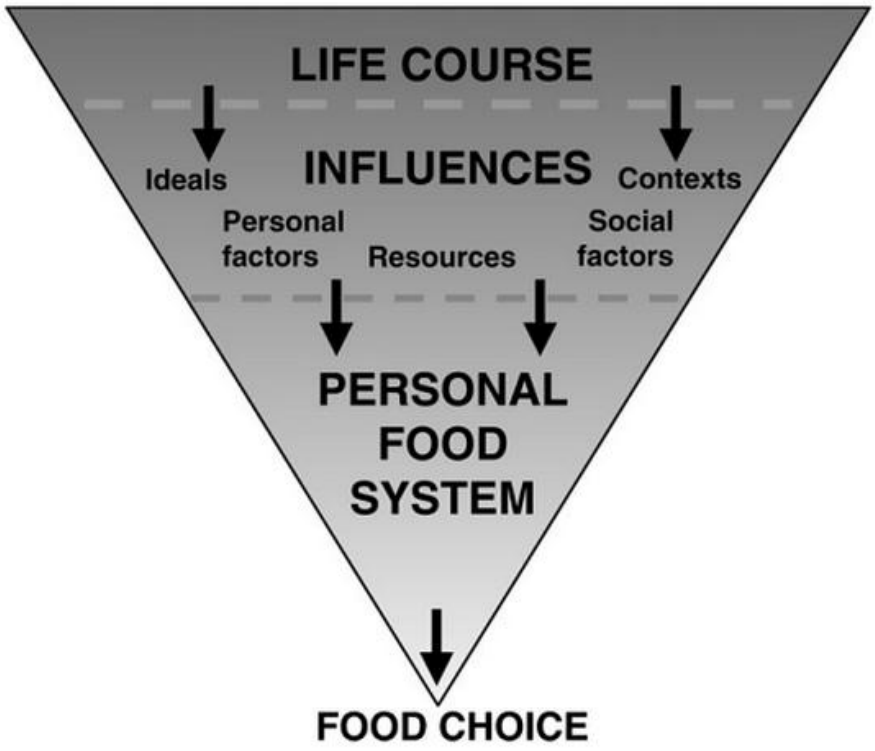


Figure 1.3 A food choice process model over a life course, adopted from Sobal et al. (2006) which is also adapted from Falk et al. (1996), Furst et al. (1996), and Conners et al. (2001). This figure was reproduced with the permission of CAB International, Wallingford, UK.

Sobal et al. (2006) evaluate that this model is comprehensive and integrated because it represents crucial parts of the process that people use in selecting foods and relationships between them, although the model is not exhaustive in explicitly listing all possible factors involved in making food choices. This model includes three major components that operate together when people construct food choices: the life course, influences, and personal food system. *Life course* conveys the fact that people often attribute their current eating patterns to prior experiences. Key concepts of constructing food choice over time include trajectories, transition, timing and contexts (Sobal et al., 2006). A person's life course provides orientation for food choices through past, present and future roles and experiences (Furst et al., 1996), with people developing personal food choice trajectories that are subject to change in relationship to

particular life course transitions they experience at different periods in their lives. Each new food choice experience adds to a person's life course and shapes subsequent food choices. Thus, life course is the fundamental component of the model.

Influences take into account all the influences of past experiences and current situations on eating. The model includes five major categories of influences upon food choice emerged consistently from Furst et al. (1996): ideals, personal factors, resources, social framework, and food context. *Ideals* cover expectations, standards, hopes, and beliefs that provide points of reference and comparison by which people judge and evaluate their food choices. *Personal factors* include physiological (sensory, genetic, etc.), psychological or emotional (preferences, personalities, moods, etc.), and relational factors (identities, self-concept, etc.) that influence food choice. These factors are learned over time for each person and provide the basis for the unique and individualized construction of food choice. *Resources* include available assets ranging from tangible physical capital (money, equipment, transportation, space) to intangible human capital (time, skills and knowledge) and intangible social capital (additional help, advice, emotional support) that people use to make food choice. *Social framework* depicts the inter-personal relationships that influence food choice. Eating often occurs in commensal groups where choosing is a process of negotiation with respect to the food selections of others. *Food contexts* are the physical surroundings and climate of food choice setting as well as specific characteristics of the food system such as availability of foods (Falk et al., 1996).

The *personal food system* for selecting foods is the process whereby people operationalize influences on food choices. Section below presents the detail of this important component of the model of food choice over the life course.

Personal food system

The personal food system represents the way that options, trade-offs, and boundaries are constructed in the process of making food choices (Sobal et al., 2006). The personal food system has two major components: (1) food-related value negotiation that involved weighing of different considerations in making food choice and (2) strategies that people use to find their way through their everyday food choices (Connors, Bisogni, Sobal, & Devine, 2001).

Value negotiations

The considerations that people weigh in making food choice decisions are labeled as *values*. In case of food, the most common values are taste, health, cost, convenience, and managing relationships (Connors et al., 2001; Furst et al., 1996; Sobal et al., 2006). *Taste* is the value related to considerations of sensory perceptions in eating and drinking. The concept of *taste* in a personal food system includes all sensory aspects of food and beverage, such as appearance, aroma, flavor, texture, and other properties. *Health* represents the considerations about physical well-being, including factors such as disease avoidance, weight control, and bodily well-being (energy health). *Cost* is about monetary considerations. This value consists of price and the perceived worth of foods to be bought. *Convenience* is the value that refers to the time and effort involved in making food choices. It covers the entire process of attaining food physically and mentally (Sobal et al., 2006). *Managing relationship* is a value of inter-personal interactions representing how someone takes other's interests and well-being into their concerns. This value is conveyed in the process of sharing foods with others or receiving foods from others. Additional values such as quality, variety, tradition, familiarity, and ethics are also included but less frequent than those mentioned above.

Strategies

From previous value negotiations, people develop habits or rules that help simplify or expedite future food choice process to minimize time needed to make choices (Connors et al., 2001; Furst et al., 1996). Such habits or rules are called simplifying decision heuristics. The food choice strategies are characterized according to the nature of the heuristic being used, including: focusing on one value, routinization, elimination, limitation, substitution, addition, and modification (Falk, Bisogni, & Sobal, 1996; Sobal et al., 2006). Simplification strategies are found to be used when people are faced with complex decisions. These strategies tend to be generally stable while allowing for flexibility in different food contexts. Figure 1.4 presents examples of strategies using different heuristics, adapted from Falk et al. (1996).

Strategy	Example
Focusing on one value (emphasize only cost, taste, health, relationships, convenience or another value)	Eat the cheapest food whenever possible
Routinization (standardize, systematize, ritualize)	Eat cereal every day for breakfast
Elimination (avoid, exclude, reduce)	Never eat desserts
Limitation (restrict, regulate, reduce)	Drink only two cups of coffee each day
Substitution (replace, exchange, fill in)	Choose brown rice instead of white rice
Addition (augment, include, enhance)	Eat a salad with every evening meal
Modification (alter, adjust, transform)	Remove fat from meats and poultry

Figure 1.4 Selected strategies for simplifying food choices (adapted from Falk et al., 1996)

Meal context in food choice

Foods are often consumed as parts of a meal, and that makes the meal the proper setting or context for all of these concerns about food. Meiselman (2008) defines meal from a number of different perspectives. Meiselman adapts the criteria used by Oltersdorf, Schlettwein-Gsell, and Winkler (1999) for defining meal, including: time of the day, energy content, social interaction, food combinations, or a combination of these criteria. Depending on which criterion is used, an eating event is a meal in one context but not a meal in another context. For instance, eating alone might never qualify as a meal if social interaction is required (Meiselman, 2008). Table 1.1 shows a number of different perspectives of meal that can be used to define meal depending on the type of information of interest.

Table 1.1 Definitions of meals based on scientific or technical discipline/orientation (adapted from Meiselman, 2008)

Perspective	Type of information
History	Meal patterns over time
Product development	Food combinations
Food service	Food sequences, food compatibilities, and sensory themes
Designer/artist	Meal locations, environments, and physical settings
Sensory	Combination of sensory experiences
Biology	Food intake timing and pattern (grazing vs. meals)
Physiology	Internal hunger and satiety signals
Nutrition/dietetics	Food intake and macro/micronutrients
Anthropology	Cultural differences
Sociology	Commensality and social rules
Psychology	Basic unit of eating
Marketing	Price/value, brand and satisfaction
Abnormal psychology/health	Undereating and overeating

Pliner and Rozin (2000) discuss the psychological perspective of meal that involves availability of food, effort to obtain or consume food, palatability and preference, mood, variety and sensory-specific satiety, learning and expectation, social factors, cultural standard and memory, and location. Pliner and Rozin also make a basic definition of a meal, i.e. people 'do most of their eating in relatively short periods of time, separated by periods of minimal if any consumption' (Meiselman, 2009). de Graaf (2000) define meal from the nutritional perspective, so that meal 'refers to the frequency, distribution, and variability of energy and nutrient intake across the day'. The social perspective is used to define meal as a structured social event where food is eaten. The historical and biological perspectives of a meal are discussed in (Meiselman, 2009), with history demonstrates the dynamic of meal and biological dimension covers all physiological, sensory, and satiety aspects of a meal. Last but not least is the cultural/social perspective. This is considered the most important aspect of meals because meals are one of the main points of cultural and social interactions (Meiselman, 2009).

Different meals are associated with different motivational factors. Peters, Rappoport, Huff-Corzine, Nelsen, and Downey (1995) report that health and convenience criteria were more important predictors of preferences for morning meals than for midday and evening meals, whereas general "liking" was mostly heavily weighted for midday and evening meals. Rappoport, Downey, and Huff-Corzine (2001) further explore that morning meals were generally seen as less expensive, more casual, convenient and lighter than other meals, while evening meals were seen as more unusual, elderly, masculine and happy than other meals. Different meals or eating events are different in size and types of foods consumed. Meals are reported to be about twice as large as snacks in terms of energy content and weight and include more carbohydrate, fat, and protein, but not alcohol, than snacks (Bellisle et al., 2003). Bellisle and

colleagues also find that meats, fish, dairy products, cheese, and fruits are consumed most in the context of meals, while sweets, cereal bars, biscuits, and sodas are reported mostly in the context of snacks. Different mealtimes are also different in emotional aspects. den Uijl, Jager, de Graaf, Waddell, and Kremer (2014) find that emotions such as *warm*, *daring*, *eager*, *enthusiastic*, *happy*, and *adventurous* are experienced more predominantly during lunch and dinner than during the other mealtimes. G*uilt* is reported particularly for snack times. Meal is especially memorable when it satisfies the need of socialization (involve family/friends), emotion (positive emotional state), and sensory biological satiety (cooked foods and wine) (Piqueras-Fiszman & Jaeger, 2015).

Measurement methods in food choice

Questionnaires and scales

Self-administered questionnaires are the most common methods in measuring food choice. Despite that self-report is often considered as invalid and unreliable, all responses to questionnaires are not always doubtful and misleading. It depends on the types of questions asked; responses to questions about frequency of behaviors are usually more reliable and valid than questions about reasons of behaviors (Köster & Mojet, 2006). Many questionnaires and scales have been developed to investigate everyday food choice motives. These include the Food Choice Questionnaire (Steptoe, Pollard, & Wardle, 1995), the Ethical Food Choice Motives Questionnaire (Lindeman & Väänänen, 2000), the Health and Taste Attitudes Questionnaire (Roininen & Tuorila, 1999), the Food Life Questionnaire (Rozin, Bauer, & Catanese, 2003), the Motivations to Eat Scale (Jackson, Cooper, Mintz, & Albino, 2003), and the Eating Motivation Survey (Renner, Sproesser, Strohbach, & Schupp, 2012). Among these, the Food Choice Questionnaire (FCQ) has been the most commonly used and adapted method in the food choice

research domain (e.g. Pieniak et al., 2009). However, there is always a need to modify and enhance the original FCQ as its original 9 categories and 36 items fail to capture some specific motives such as concern, religion, political values, and ethical concern (Ares & Gámbaro, 2007; Share & Stewart-Knox, 2012). The robustness of FCQ, furthermore, is not supported by the empirical data in Fotopoulos et al (2009). Findings of Eertmans, Victoir, Notelaers, Vansant, and Van den Bergh (2006) also raise the question about the generalizability of the FCQ's factor structure. Meanwhile, the Eating Motivation Survey (TEMS), as a relatively new method, attempts to capture a wide-range of motives underlying eating behavior (Renner et al., 2012). This questionnaire is developed within a frame of three studies: (1) generating motives for eating behavior from different data sources (previous research, nutritionist interviews, and expert discussions), (2) development and refinement of the item pool to finalize TEMS, (3) testing of TEMS by conducting confirmatory factor analyses. TEMS is proved to be a comprehensive measurement of why people eat what they eat.

Food diaries

A food diary is mainly used to investigate dietary behavior. The method basically asks the respondents to record all food and beverage items as well as the amounts consumed in a specific period of time, commonly 24 hours (one day) or one week. Additional information about contextual factors such as meal, time, place, social interaction, and activity are also recorded. Pears et al. (2012) validate the ability of a 24-h food diary (the DIET-24) to accurately detect change in children's fruit and vegetable consumption at school snack time following implementation of the Food Dudes healthy eating intervention. Bellisle et al. (2003) investigate the relative contributions of meals and snacks in the daily intake of 54 French adults using the weekly food diary method. The food intake diaries are recorded for four 7-day periods, including

all food and fluid intakes mentioning whether, in their opinion, each intake event is a snack or a meal. The weekly food diaries also contain information on the circumstances of each event such as time and place, number of persons present, and affective states (hunger, satiety, etc.) before and after intake. This study demonstrates how the weekly food diary method can give insights into a specific role for snacks, as opposed to meals, in the daily eating pattern of healthy adults. Pollard, Greenwood, Kirk and Cade (2002) employ both food diary and the FCQ to investigate how attitudes to fruit and vegetables differ between consumers of high and low-consumption, with respect to food choice motivations, and to identify what value they place on different aspects of food choice behavior. As a result, health and natural content are found to be the strongest motivations specifically affecting fruit and vegetable intake.

The Food Choice Map

Another recent measurement method of people food choice was developed by Sevenhuysen and Gross (2003). This technique is a qualitative interview procedure that records the frequency of food consumption and the reasons for food choices, aka the Food Choice Map (FCM). In a FCM interview, respondents are asked to recall foods they ate often in a usual week, followed by questions about the meal or snack times, foods eaten less frequently at those meals, and a variety of aspects related to those foods and their frequencies of consumption, such as where purchased, when and with whom consumed, likely important for health, perception of cost, and other aspects of interest to the respondent. Below are some types of reasons found from the study of Sevenhuysen and Gross (2003).

Type of reason	**Examples**
Time pressure living situation	Recently I have started eating macaroni because it saves time
Health perception of chicken and fish	I eat chicken or fish many times because high quality protein is better
Food Cost	It is difficult to eat well, so when I can I choose chicken because it is less expensive

The respondents also help to create a visual record, or map, of food frequencies, by placing food symbols (generic picture of a food) on a board or a large sheet of paper (Figure 1.5). The FCM helps to identify reasons for changes in food choice. The FCM also links data on dietary behaviors with perceptions that respondents use to explain of those behaviors. This method can be structured to provide more detail of motivational, social, and cultural factors. The FCM was validated by Shuaibi, Sevenhuysen, and House (2008) and Hui, Sevenhuysen, Harvey, and Salamon (2014).

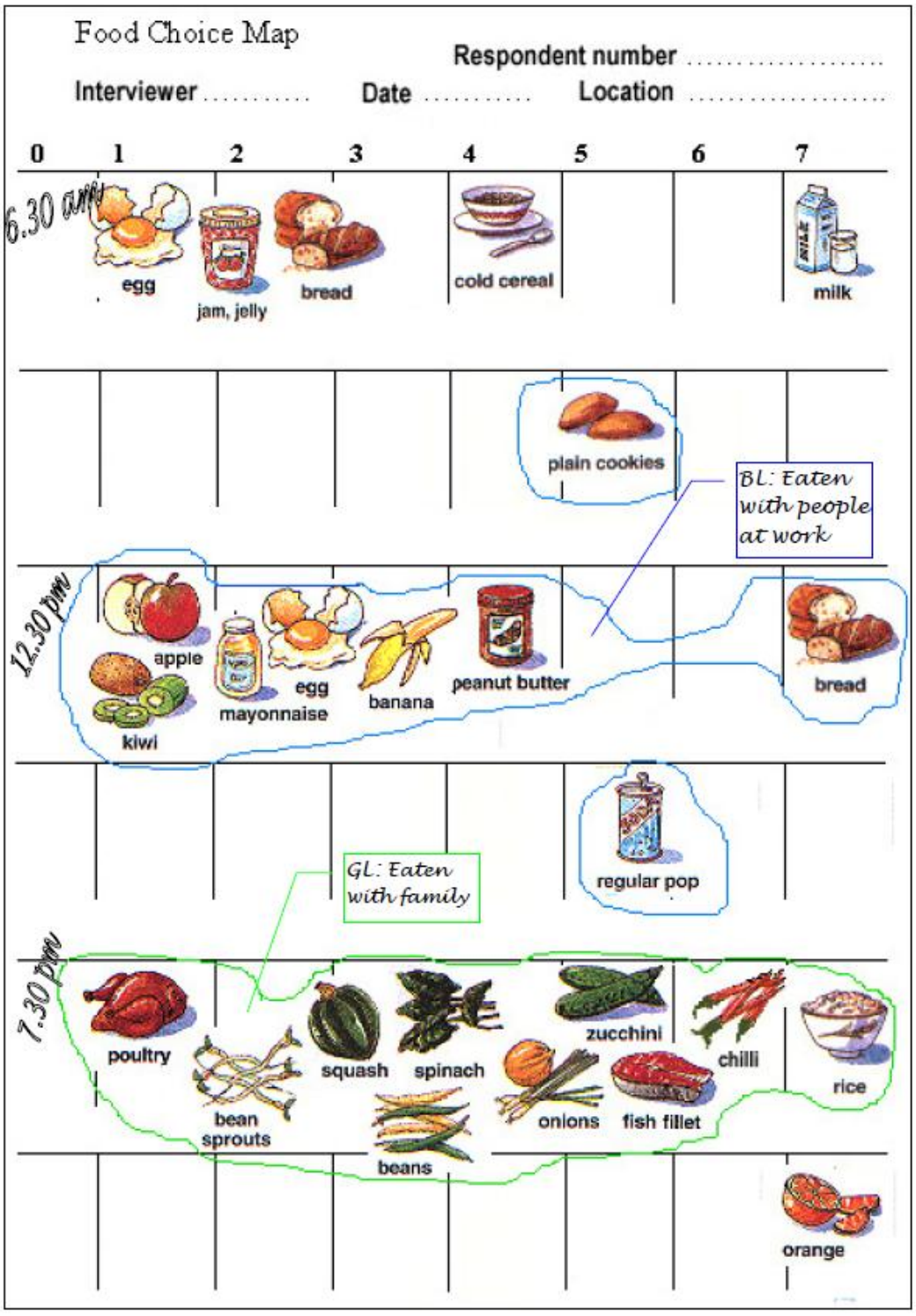


Figure 1.5 The Food Choice Map (source: Sevenhuysen and Gross, 2003). This figure was reproduced with the permission of the Asia Pacific Journal of Clinical Nutrition.

References

Aertsens, J., Verbeke, W., Mondelaers, K., & Van Huylenbroeck, G. (2009). Personal determinants of organic food consumption: A review. *British Food Journal, 111,* 1140-1167.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds), *Action control: From cognition to behavior* (pp. 11-39). Berlin Heidelberg: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179-211.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Engle-wood-Cliffs, N.J.: Prentice-Hall.

Ares, G., & Gámbaro, A. (2007). Influence of gender, age and motives underlying food choice on perceived healthiness and willingness to try functional foods. *Appetite, 49,* 148-158.

Armitage, C. J., & Conner, M. (1999). Distinguishing perceptions of control from Self-Efficacy: Predicting consumption of a Low-Fat diet using the theory of planned behavior. *Journal of Applied Social Psychology, 29*, 72-90.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, *40*, 471-499.

Arvola, A., Vassallo, M., Dean, M., Lampila, P., Saba, A., Lähteenmäki, L., & Shepherd, R. (2008). Predicting intentions to purchase organic food: The role of affective and moral attitudes in the theory of planned behaviour. *Appetite, 50*, 443-454.

Atkinson, J. W. (1964). *An introduction to motivation*. Oxford, England: Van Nostrand.

Backman, D. R., Haddad, E. H., Lee, J. W., Johnston, P. K., & Hodgkin, G. E. (2002). Psychosocial predictors of healthful dietary behavior in adolescents. *Journal of Nutrition Education and Behavior, 34*, 184-193.

Bellisle, F., Dalix, A., Mennen, L., Galan, P., Hercberg, S., De Castro, J., & Gausseres, N. (2003). Contribution of snacks and meals in the diet of French adults: A diet-diary study. *Physiology & Behavior, 79*, 183-189.

Berg, C., Jonsson, I., & Conner, M. (2000). Understanding choice of milk and bread for breakfast among Swedish children aged 11–15 years: An application of the theory of planned behaviour. *Appetite, 34*, 5-19.

Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., & Devine, C. M. (2007). Dimensions of everyday eating and drinking episodes. *Appetite, 48*, 218-231.

Bissonnette, M. M., & Contento, I. R. (2001). Adolescents' perspectives and food choice behaviors in terms of the environmental impacts of food production practices: Application of a psychosocial model. *Journal of Nutrition Education, 33*, 72-82.

Blake, C. E., Bisogni, C. A., Sobal, J., Jastran, M., & Devine, C. M. (2008). How adults construct evening meals. Scripts for food choice. *Appetite, 51*, 654-662.

Blake, C. E., Bisogni, C. A., Sobal, J., Devine, C. M., & Jastran, M. (2007). Classifying foods in contexts: How adults categorize foods for different eating settings. *Appetite, 49*, 500-510.

Carrillo, E., Prado-Gascó, V., Fiszman, S., & Varela, P. (2012). How personality traits and intrinsic personal characteristics influence the consumer's choice of reduced-calorie food. *Food Research International, 49*, 792-797.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*, 1429-1464.

Conner, M., & Armitage, C. J. (2006). Social psychological models of food choice. In R. Shepherd, & M. Raats (Eds.), *The psychology of food choice,* (pp. 41-57). CABI Publishing.

Conner, M., Norman, P., & Bell, R. (2002). The theory of planned behavior and healthy eating. *Health Psychology, 21*, 194.

Connors, M., Bisogni, C. A., Sobal, J., & Devine, C. M. (2001). Managing values in personal food systems. *Appetite, 36*, 189-200.

de Boer, J., Hoogland, C. T., & Boersema, J. J. (2007). Towards more sustainable food choices: Value priorities and motivational orientations. *Food Quality and Preference, 18*, 985-996.

de Graaf, C. (2000). Nutritional definitions of the meal. In H. L. Meiselman (Ed.), *Dimensions of the meal.the science, culture, business, and art of eating* (pp. 47-59). Gaithersburg, MD: Aspen.

den Uijl, L. C., Jager, G., de Graaf, C., Waddell, J., & Kremer, S. (2014). It is not just a meal, it is an emotional experience – A segmentation of older persons based on the emotions that they associate with mealtimes. *Appetite, 83,* 287-296.

Dovey, T. M., Staples, P. A., Gibson, E. L., & Halford, J. C. (2008). Food neophobia and 'picky/fussy' eating in children: A review. *Appetite, 50,* 181-193.

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53,* 109-132.

Eertmans, A., Victoir, A., Notelaers, G., Vansant, G., & Van den Bergh, O. (2006). The food choice questionnaire: Factorial invariant over western urban populations? *Food Quality and Preference, 17,* 344-352.

Eertmans, A., Victoir, A., Vansant, G., & Van den Bergh, O. (2005). Food-related personality traits, food choice motives and food intake: Mediator and moderator relationships. *Food Quality and Preference, 16*, 714-726.

Falk, L. W., Bisogni, C. A., & Sobal, J. (1996). Food choice processes of older adults: A qualitative investigation. *Journal of Nutrition Education, 28*, 257-265.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Reading, UK: Addison-Wesley.

Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: A conceptual model of the process. *Appetite, 26*, 247-266.

Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. (1998). Why americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association, 98,* 1118-1126.

Hansen, T., Møller Jensen, J., & Stubbe Solgaard, H. (2004). Predicting online grocery buying intention: A comparison of the theory of reasoned action and the theory of planned behavior. *International Journal of Information Management, 24*, 539-550.

Henriques, A. S., King, S. C., & Meiselman, H. L. (2009). Consumer segmentation based on food neophobia and its application to product development. *Food Quality and Preference, 20*, 83-91.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In P. M. Zanna (Ed.), *Advances in experimental social psychology* (pp. 1-46). San Diego, CA: Academic Press Inc. LTD.

Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. *European Journal of Social Psychology, 31*, 3-23.

Hoyer, W. D., & Ridgway, N. M. (1984). Variety seeking as an explanation for exploratory purchase behavior: A theoretical model. *Advances in Consumer Research, 11*, 114-119.

Hui, A. L., Sevenhuysen, G., Harvey, D., & Salamon, E. (2014). Food choice decision-making by women with gestational diabetes. *Canadian Journal of Diabetes, 38*, 26-31.

Jackson, B., Cooper, M. L., Mintz, L., & Albino, A. (2003). Motivations to eat: Scale development and validation. *Journal of Research in Personality, 37*, 297-318.

Köster, E. P. (2009). Diversity in the determinants of food choice: A psychological perspective. *Food Quality and Preference, 20*, 70-82.

Köster, E., & Mojet, J. (2006). Theories of food choice development. In L. Frewer, & H. v. Trijp (Eds.), *Understanding consumers of food products* (pp. 93-124). Woodhead Publishing Ltd.

Lindeman, M., & Väänänen, M. (2000). Measurement of ethical food choice motives. *Appetite, 34*, 55-59.

Marcontell, D. K., Laster, A. E., & Johnson, J. (2003). Cognitive-behavioral treatment of food neophobia in adults. *Journal of Anxiety Disorders, 17*, 243-251.

Meiselman, H. L. (2008). Dimensions of the meal. *Journal of Foodservice, 19*, 13-21.

Meiselman, H. L. (2009). Dimensions of the meal: A summary. In H. L. Meiselman (Ed.*), Meals in science and practice: Interdisciplinary research and business applications* (pp. 1-15). Boca Raton, FL: Woodhead Publishing Ltd and CRC Press LLC.

Menon, S., & Kahn, B. E. (1995). The impact of context on variety seeking in product choices. *Journal of Consumer Research, 22*, 285-295.

Milošević, J., Žeželj, I., Gorton, M., & Barjolle, D. (2012). Understanding the motives for food choice in western Balkan countries. *Appetite, 58,* 205-214.

Nicklaus, S., Boggio, V., Chabanet, C., & Issanchou, S. (2005). A prospective study of food variety seeking in childhood, adolescence and early adult life. *Appetite, 44,* 289-297.

Olsen, S. O. (2002). Comparative evaluation and the relationship between quality, satisfaction, and repurchase loyalty. *Journal of the Academy of Marketing Science, 30,* 240-249.

Oltersdorf, U., Schlettwein-Gsell, D., & Winkler, G. (1999). Assessing eating patterns—an emerging research topic in nutritional sciences: Introduction to the symposium. *Appetite, 32,* 1-7.

Pears, S. L., Jackson, M. C., Bertenshaw, E. J., Horne, P. J., Lowe, C. F., & Erjavec, M. (2012). Validation of food diaries as measures of dietary behaviour change. *Appetite, 58,* 1164-1168.

Peters, G. R., Rappoport, L. H., Huff-Corzine, L., Nelsen, C., & Downey, R. G. (1995). Food preferences in daily life: Cognitive, affective and social predictors. *Ecology of Food and Nutrition, 33,* 215-228.

Petri, H., & Govern, J. (2012). *Motivation: Theory, research, and application.* Belmont, CA: Wadsworth, Cengage Learning.

Pieniak, Z., Verbeke, W., Vanhonacker, F., Guerrero, L., & Hersleth, M. (2009). Association between traditional food consumption and motives for food choice in six European countries. *Appetite, 53,* 101-108.

Piqueras-Fiszman, B., & Jaeger, S. R. (2015). What makes meals 'memorable'? A consumer-centric exploration. *Food Research International,* 76, 233-242.

Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite, 19*, 105-120.

Pliner, P., & Rozin, P. (2000). The psychology of the meal. In H. L. Meiselman (Ed.), *Dimensions of the meal: The science, culture, business, and art of eating* (pp. 19-46). Gaithersburg, Md: Aspen Publishers.

Pollard, J., Greenwood, D., Kirk, S., & Cade, J. (2002). Motivations for fruit and vegetable consumption in the UK women's cohort study. *Public Health Nutrition, 5*, 479-486.

Prescott, J., Young, O., O'neill, L., Yau, N., & Stevens, R. (2002). Motives for food choice: A comparison of consumers from Japan, Taiwan, Malaysia and New Zealand. *Food Quality and Preference, 13*, 489-495.

Pula, K., Parks, C. D., & Ross, C. F. (2014). Regulatory focus and food choice motives. prevention orientation associated with mood, convenience, and familiarity. *Appetite, 78*, 15-22.

Rah, J. H., Hasler, C. M., Painter, J. E., & Chapman-Novakofski, K. M. (2004). Applying the theory of planned behavior to women's behavioral attitudes on and consumption of soy products. *Journal of Nutrition Education and Behavior, 36*, 238-244.

Rappoport, L., Downey, R. G., & Huff-Corzine, L. (2001). Conceptual differences between meals. *Food Quality and Preference, 12*, 9-17.

Raudenbush, B., & Frank, R. A. (1999). Assessing food neophobia: The role of stimulus familiarity. *Appetite, 32*, 261-271.

Renner, B., Sproesser, G., Strohbach, S., & Schupp, H. T. (2012). Why we eat what we eat. The eating motivation survey (TEMS). *Appetite, 59*, 117-128.

Roininen, K., & Tuorila, H. (1999). Health and taste attitudes in the prediction of use frequency and choice between less healthy and more healthy snacks. *Food Quality and Preference, 10*, 357-365.

Rozin, P. (2007). Food choice: An introduction. In L. Frewer, & H. van Trijp (Eds.), *Understanding consumers of food choice* (pp. 3-29). Boca Raton, FL: Woodhead Publishing Ltd and CRC Press LLC.

Rozin, P., Bauer, R., & Catanese, D. (2003). Food and life, pleasure and worry, among American college students: Gender differences and regional similarities. *Journal of Personality and Social Psychology*, *85*, 132-141.

Schulte-Mecklenbeck, M., Sohn, M., de Bellis, E., Martin, N., & Hertwig, R. (2013). A lack of appetite for information and computation. simple heuristics in food choice. *Appetite, 71*, 242-251.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*, 1-65.

Schwartz, S. H., & Bilsky, W. (1990). Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. *Journal of Personality and Social Psychology*, *58*, 878- 891.

Schwartz, S. H., & Bilsky, W. (1987). Toward a universal psychological structure of human values. *Journal of Personality and Social Psychology*, *53*, 550-562.

Sevenhuysen, G. P., & Gross, U. (2003). Documenting the reasons people have for choosing their food. *Asia Pacific Journal of Clinical Nutrition, 12*, 30-37.

Shah Alam, S., & Mohamed Sayuti, N. (2011). Applying the theory of planned behavior (TPB) in halal food purchasing. *International Journal of Commerce and Management, 21*, 8-20.

Share, M., & Stewart-Knox, B. (2012). Determinants of food choice in Irish adolescents. *Food Quality and Preference, 25*, 57-62.

Shepherd, R., & Sparks, P. (1994). Modelling food choice. In H. J. H. MacFie, & D. M. H. Thomson (Eds.), *Measurement of food preferences* (pp. 202-226). Springer.

Shuaibi, A. M., Sevenhuysen, G. P., & House, J. D. (2008). Validation of a food choice map with a 3-day food record and serum values to assess folate and vitamin B-12 intake in college-aged women. *Journal of the American Dietetic Association, 108*, 2041-2050.

Sobal, J., Bisogni, C. A., Devine, C. M., & Jastran, M. (2006). A conceptual model of the food choice process over the life course. In R. Shepherd & M. Raats (Eds), *The psychology of food choice* (pp. 1-18). Wallingford, UK: CAB International.

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite*, *25*, 267-284.

United Nations World Food Programme. (2015). Hunger statistics. Retrieved from http://www.wfp.org/hunger/stats.

USDA. (2014). Food security in the U.S.: Key statistics and graphics. Retrieved from http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx

Van Trijp, J. (1995). Variety-seeking in product choice behavior. Theory with applications in the food domain (Doctoral Dissertation). Retrieved from http://edepot.wur.nl/136824.

Van Trijp, H. C. (1994). Product-related determinants of variety-seeking behavior for foods. *Appetite, 22*, 1-10.

Van Trijp, H. C., & Steenkamp, J. E. (1992). Consumers' variety seeking tendency with respect to foods: Measurement and managerial implications. *European Review of Agricultural Economics, 19,* 181-195.

Walker, E. L. (1980). *Psychological complexity and preference: A hedgehog theory of behavior.* Brooks: Cole Pub. Co.

Wigfield, A., Tonks, S., & Klauda, S. L. (2009). Expectancy-value theory. In A. Wigfield & K. R. Wentzel (Eds.), *Handbook of Motivation at School*, (pp. 55-75). New York, NY: Routledge.

Wong, R. (2000). *Motivation: A biobehavioural approach.* Cambridge, UK: Cambridge University Press.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9*, 1-27.

Chapter 2 - Motivations associated with eating occasions

Abstract

Daily food choice is a complex decision influenced by various factors. What motivates people to choose foods for breakfast may be different from the motivations driving other eating occasions. Because such information may be important to the structure of food studies (i.e. what key characteristics should be measured?) this study aimed to explore motivations behind everyday meals by looking at specific choices of foods and beverages people consumed at various meal times. This study was conducted using an online survey with 198 people 18 years and older who had lived in the US for at least 10 years. The survey included questions related to demographics, the most recent meal including specific food choices, and a slightly modified Eating and Motivation Survey (2 motivations were added), which contained 50 sub-scales to measure 17 motivations including such topics as Habits, Health, Liking, Pleasure, Price, etc. The participants checked all the motivations that applied for each food item that they consumed in the meal reported. Check-All-That-Apply data for motivations were analyzed by Correspondence Analysis. Liking was the strongest motivation that drove people to select certain foods, regardless of meal. Need and Hunger, Habits, Price, and Convenience were the main motivations for breakfast, lunch, and dinner while Health and Weight Control were found to be the main driving factors for mid-morning and mid-afternoon snacking. Late-night snacks were linked to Pleasure and Visual appeal. For dinner, people were motivated most by Variety Seeking and Traditional Eating. Food selection and the motivations of those selections usually were dependent on liking, but other motivators differed across eating occasions. This suggests that the intended meal time is a key factor that should be considered when testing food and beverage products.

Introduction

The importance of situational factors in eating behavior has been acknowledged by many researchers because foods mean different things to different people in different contexts (Blake, Bisogni, Sobal, Devine, & Jastran, 2007). Bisogni et al. (2007) provided a conceptual framework for understanding of situational nature of eating and drinking as discrete episodes with eight dimensions: food and drinks, time, location, activities, social setting, mental processes, physical conditions, and recurrence. Blake et al. (2007) found that depending on the context, foods can be categorized into 12 different categories, i.e. routine, preference, well-being (personal-experience-based types), meal/time, meal component, convenience, location, source, person (context-based types), food group, nutrient composition and physical characteristics (food-based types). Particularly, Blake, Bisogni, Sobal, Jastran and Devine (2008) discovered eight different kinds of scripts including Provider, Family Cook, Head of the table, Egalitarian, Struggler, Just eat, Anything goes, and Entertainer for an evening meal.

Meiselman (2000, 2009) has brought into attention the importance of meal context in food choice because most food is consumed as part of a meal. The author stated that "without considering the meal, one cannot have a major impact on foods and eating". However, researchers and academics still often ignore the context of meal in food choice research (Meiselman, 2007). Meiselman pointed out that food products are often developed in isolation not as part of a meal and there is currently a lack of interdisciplinary research on meals. Research on normal eating did not receive much interest within the US, resulting in a lack of information on how most people eat on a daily basis.

According to Meiselman (2008), meal is a complex concept because it refers to both the event of eating and what is eaten. In other words, meal is both an event and a product. Definition of meal is considered from many different perspectives, from psychological, nutritional, social,

historical, biological, cultural aspects to food service industry. To qualify as a meal, an eating occasion should satisfy a number of criteria such as time of the day, energy content, social interaction, food combinations, or a combination of these criteria or other criteria (Oltersdorf, Schlettwein-Gsell, & Winkler, 1999).

Different meals are associated with different motivational factors. Peters, Rappoport, Huff-Corzine, Nelsen, and Downey (1995) reported that health and convenience criteria were more important predictors of preferences for morning meals than for midday and evening meals, whereas general "liking" was mostly heavily weighted for midday and evening meals. Rappoport, Downey, and Huff-Corzine (2001) further explored that morning meals were generally seen as less expensive, more casual, convenient and lighter than other meals, while evening meals were seen as more unusual, elderly, masculine and happy than other meals. Different meals or eating events are different in size and types of foods consumed. Meals are reported to be about twice as large as snacks in terms of energy content and weight and include more carbohydrate, fat, and protein, but not alcohol, than snacks (Bellisle et al., 2003). Bellisle and colleagues also found that meats, fish, dairy products, cheese, and fruits are consumed most in the context of meals, while sweets, cereal bars, biscuits, and sodas are reported mostly in the context of snacks. Different mealtimes are also different in emotional aspects. den Uijl, Jager, de Graaf, Waddell, and Kremer (2014) found emotions such as *warm, daring, eager, enthusiastic, happy*, and *adventurous* were experienced more predominantly during lunch and dinner than during the other mealtimes. G*uilt* was reported particularly for snack times. Meal is especially memorable when it satisfies the need of socialization (involve family/friends), emotion (positive emotional state), and sensory biological satiety (cooked foods and wine) (Piqueras-Fiszman & Jaeger, 2015).

This study, as part of a project investigating motivations of everyday food choice, aimed to investigate the motivations of people's food choice in six different eating contexts, including breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and late-night snack. Instead of asking people to directly express their motivations of choosing foods for the meals of interest, this study used a bottom-up approach by asking people to report all food items they actually consumed in their latest meal and indicated motivations for each food item listed. Motives collected from the food items were then linked to the corresponding meals. This approach averted people's attention to the food items, not the meals, for them to be more engaged when providing their motivations.

Materials and Methods

Participants

The participants were recruited using announcement ads in K-State Today, a daily email providing faculty, staff, and students of Kansas State University with updated news and announcements across campuses. The ads provided people a link to an online screener to verify their qualification for the study. The participants had to be 18 or older, and have lived in the United States for more than 10 years. Their employment status was used as quotas for recruitment with at least 50% of the recruits were full time employees. A total of 204 people were recruited but only 198 completed the survey. They were paid $10 for their time; however, there were 22 participants who did not provide information for payment, which resulted in 22 missing data for age and occupation.

Online survey questionnaire

Qualified participants were asked to complete an online survey operated in Qualtrics software (Qualtrics, Provo, UT, USA) licensed for Kansas State University. The survey

questionnaire has been reviewed and approved by the Internal Review Board of Kansas State University. The questionnaire included three sections: (1) Demographic information, which recorded sex, race/ethnicity, State of residence, occupation, and income. (2) Eating occasion and food consumption, which recorded the most recent meal with details about: where that meal was consumed, at what time of the day it was consumed, how many food/beverage items were consumed and what they were, and with whom that meal was eaten. Six meal options were provided, including breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and late-night snack. Option "Other" was also provided for each question in case the response did not fall in the categories provided. (3) The Eating Motivation Survey (TEMS) using Check -All-That-Apply (CATA) procedure for each food item specified in section 2 above. TEMS included 17 motivations, i.e. Liking, Habits, Need and Hunger, Health, Convenience, Pleasure, Traditional Eating, Natural Concerns, Sociability, Price, Visual Appeal, Weight Control, Affect Regulation, Social Norms, Social Image, Choice Limitation, and Variety Seeking. The first 15 motivations were adapted from Renner, Sproesser, Strohbach and Schupp (2012), and the last two were added for this project. Each motivation, except for Convenience, Choice Limitation, and Variety Seeking, was measured by 3 items, for instance, "because I am accustomed to eating it", "because I usually eat it" and "because I am familiar with it" were three items used to examine Habits; "because I have a an appetite for it", "because it tastes good", and "because I like it" were three items for Liking. Convenience was measured by 4 items: "because it is quick to prepare", "because it is easy to prepare", "because it is the most convenient", and "because someone made it for me and it is the choice". Choice Limitation and Variety Seeking were measured by only 2 items: "because it is the only choice" and "because it is what is served" for

Choice Limitation, and “because I like to eat a variety of different foods each day” and “because I don't like to eat the same food for the same meal everyday” for Variety Seeking.

Data analysis

Descriptive statistics were used to summarize the respondents’ demographic data. Each food item was recorded and classified based on the meal reported by the respondents. The food items were then classified into different food groups, such as breakfast cereals, vegetables and vegetable products, or sausage and luncheon meats and so on, based on the National Nutrient Database for Standard Reference Release 27 of USDA (http://ndb.nal.usda.gov/ndb/foods). The food group data were then computed into proportions for each meal time and proportion tests using Pearson’s chi-squared test statistics were performed on these proportions to identify which food groups were often consumed in which eating occasion. CATA count data collected from 50 TEMS subscales were grouped into 17 motivation factors for each of six eating context options. The count data for these 17 factors were then computed into proportions to remove the effect of sample size due to the difference among the numbers of responses for each of the meal options. The motivation proportion data were linked to the eating occasions using Correspondence Analysis (CA) in FactoMineR package (Husson, Josse, Lê, and Mazet, 2007), to extract main motives for each eating event. Proportion tests using Pearson’s chi-squared test statistic were also performed on the data to validate the main motives for each eating occasion. All analysis was performed in R 3.0.1 (The R Foundation for Statistical Computing).

Results

Respondents’ demographics

Table 2.1 provides the demographic information of 198 respondents (162 females and 36 males) of the study, who mainly resided in Manhattan, Kansas. The majority of the respondents

(43%) were between 23 and 44 years old. Two age groups 18-22 and 45-60 had about the same number of respondents (26% and 24% respectively). Seven percent of the respondents were between 61 and 74 years old. Eighty nine percent of the respondents were White/Caucasian. Hispanic/Latino and Black/African American were about 5% each. Asian was only 2% of the respondents. About one third of the respondents had annual income between $50,000 and $99,999. About 41% had annual income below $50,000; 16% had income above $100,000; and 16% preferred not to answer. About 90% of the respondents were employed, with 56% full time and 32% part time. Fifty eight percent of the respondents were not full time students.

Table 2.1 Demographic information of 198 respondents participated in the online survey

Demographic Information	Number of respondents	Percentage
Age*		
18 - 22	45	26%
23 - 44	76	43%
45 - 60	42	24%
61 - 74	13	7%
Sex		
Female	162	82%
Male	36	18%
Race/Ethnicity		
Hispanic / Latino	10	5%
White / Caucasian	176	89%
Black / African American	9	4.5%
Asian	3	1.5%
Annual Income		
≤ 25,000	43	22%
25,001 - 49,999	37	19%

50,000 - 99,999	64	32%
≥ 100,000	31	16%
Prefer not answer	23	12%
Employment Status*		
Employed, full time	98	56%
Employed, part time	56	32%
Homemaker	2	1%
Retired	4	2%
Unemployed	16	9%
Full-time students*		
Yes	74	42%
No	102	58%
Most recent meal		
Breakfast	53	27%
Mid-morning snack	19	10%
Lunch	67	34%
Mid-afternoon snack	20	10%
Dinner	30	15%
Late night snack	8	4%
Other	1	1%

(*) data from 176 respondents

Among 198 respondents, 53 reported their most recent meal was breakfast, and therefore, all the food items and motivations they provided for those food items were for breakfast. Similarly, the number of sample size for other meals were: 19 for mid-morning snack, 67 for lunch, 20 for mid-afternoon snack, 30 for dinner, and 8 for late-night snack. Breakfast was consumed mostly between 7 and 9 AM. Morning snacking was often consumed from 8 to 11 AM. Lunch time was around 11 AM to 1 PM. Afternoon snacking has the consumption time

between 1 and 5 PM. Dinner was around 5 to 8 PM and late-night snacking was reported to be from 8 PM to midnight.

Consumption patterns for six eating occasions

Figure 2.1 provides the information of the location where the respondents ate their meal. Given that the majority of the respondents were employed, breakfast, mid-morning snack, lunch, and mid-afternoon snack were mainly consumed either at home or at work. However, dinner and late-night snack were mostly consumed at home. Figure 2.2 shows the percentage of each type of different people/companies the respondents had their meal with. Eating alone was the main stream for almost all eating occasions, except for dinner which was more likely to be consumed with family and friends than the other meals. Snacking, in general, appeared to be more of a personal eating event, and it was often consumed alone.

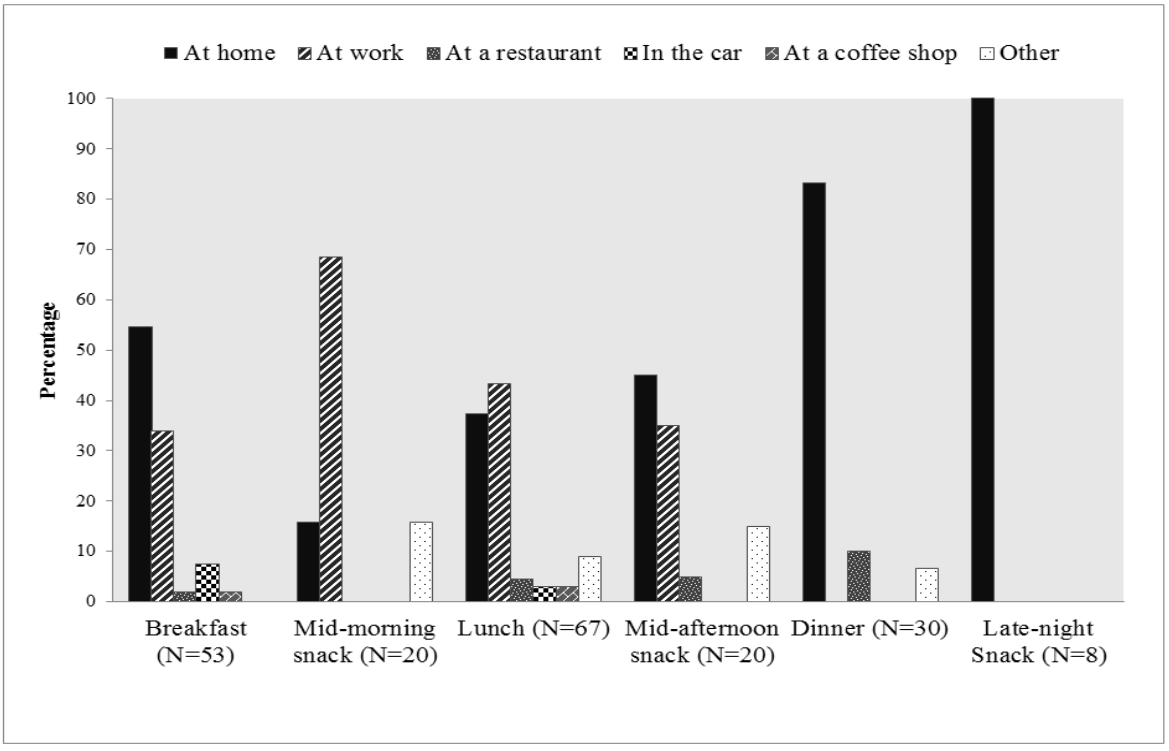


Figure 2.1 Percentage of each location where the respondents consumed their most recent meal/snack reported for the study

Figure 2.3 presents the distribution (in percentage) of the number of the food and beverage items the respondents ate at each meal time. For breakfast, people mostly ate 1 or 2 items. Four was the highest number of items for breakfast reported in the study. The number of food and beverage items for lunch and dinner were the most diversified, from 1 to 7, mostly among 2 and 4. People did not eat many items for snacks in general, only one or two items for day-time snacking and one to three items for late-night snacking.

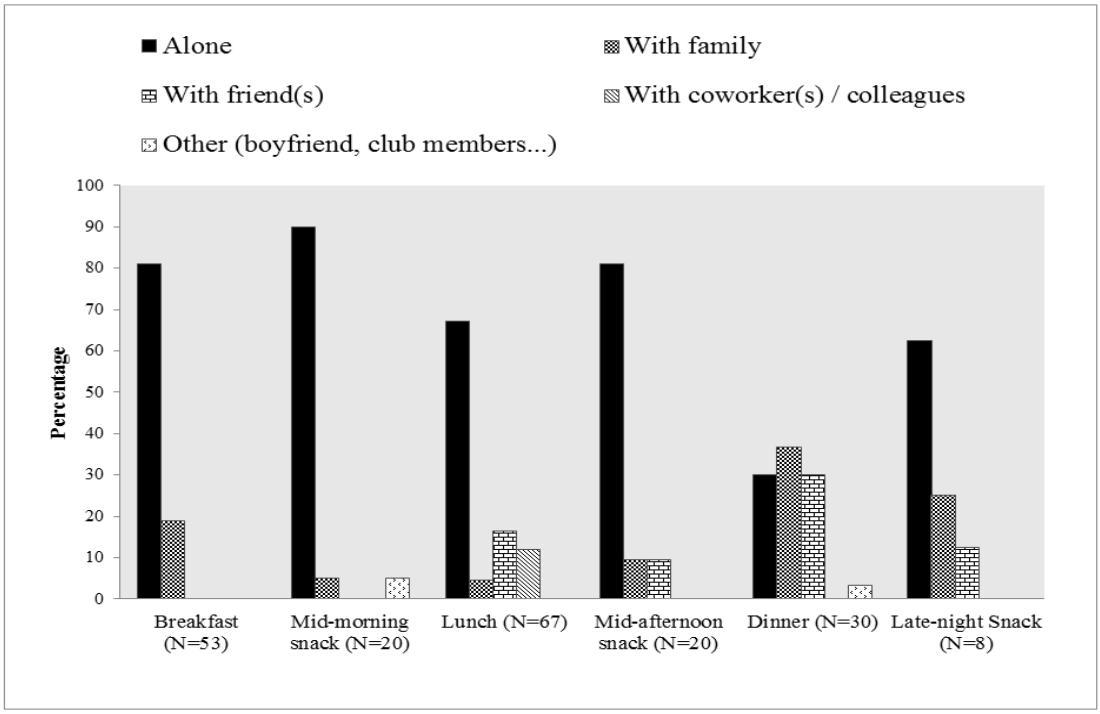


Figure 2.2 Percentages of people engaging in each eating occasions with the respondents

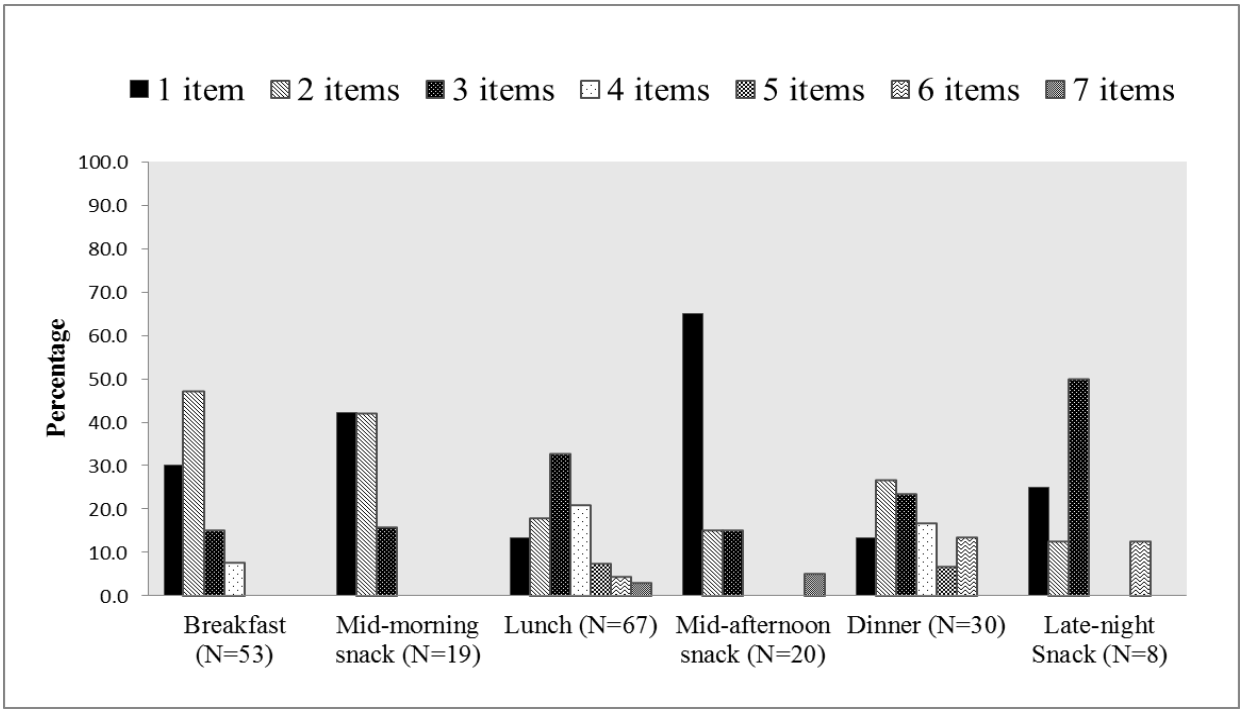


Figure 2.3 Distribution (in percentage) of the number of the food and beverages, from 1 to 7 items, the respondents consumed at their corresponding meal times.

Table 2.2 Frequency (%) of primary food groups consumed in each eating occasions

Category	Breakfast	Mid-morning snack	Lunch	Mid-afternoon snack	Dinner	Late night snack	p-value**
Total food items mentioned	105	31	205	30	89	17	
Baked products	20.00	9.68	16.59	10.00	7.87	11.76	0.1842
Alcoholic beverages	0.00	0.00	0.00	0.00	**3.37**	0.00	**0.0219**
Chocolate beverages	0.95	0.00	0.00	0.00	0.00	0.00	0.6158
Coffee	**12.38**	3.23	1.46	0.00	0.00	0.00	**<0.0001**
Shake	1.90	0.00	0.00	0.00	0.00	0.00	0.2122
Soda	1.90	3.23	3.90	3.33	1.12	5.88	0.7562
Tea	0.95	6.45	1.46	0.00	2.25	0.00	0.3414
Water	7.62	0.00	9.76	13.33	11.24	5.88	0.4308
Unspecified	0.95	0.00	0.98	0.00	1.12	0.00	0.9764
Breakfast cereals	**10.48**	0.00	0.49	3.33	0.00	5.88	**<0.0001**
Cereal grains and pasta	0.00	0.00	**3.90**	0.00	**7.87**	0.00	**0.0249**
Dairy and egg	**20.00**	9.68	7.32	3.33	8.99	11.76	**0.0143**

products							
Fast foods	0.95	0.00	4.88	0.00	6.74	11.76	0.0769
Fruits and fruit juices	10.48	**29.03**	10.73	**30.00**	6.74	**17.65**	**0.0012**
Legumes and legume products	0.00	0.00	1.46	**10.00**	0.00	**5.88**	**0.0009**
Meals, entrée, and side dishes	3.81	0.00	6.83	0.00	4.49	0.00	0.2855
Nuts and seed products	0.95	**9.68**	0.98	0.00	0.00	0.00	**0.0015**
Pork products	0.95	0.00	0.49	0.00	1.12	0.00	0.9556
Poultry products	0.00	0.00	3.41	0.00	5.62	0.00	0.1135
Sausages and Luncheon Meats	0.00	0.00	1.95	0.00	4.49	0.00	0.1861
Snacks	5.71	**29.03**	5.85	**23.33**	5.62	**11.76**	**<0.0001**
Soup, sauce, and gravies	0.00	0.00	0.98	0.00	2.25	0.00	0.5908
Sweets	0.00	0.00	3.41	3.33	2.25	11.76	0.0692
Vegetables & vegetable products	0.00	0.00	**13.17**	0.00	**16.85**	0.00	**<0.0001**

(**) p-value of two-sided proportion test using Pearson's Chi-square test statistic, df = 5; values in bold - significant at alpha = 0.05. The number of food and beverage items per each category were computed into proportions by dividing by the number of total food and beverage items for each meal time, for instance, for breakfast, the item per each category was divided by 105**.**

A total of 477 food and beverages items were reported from 198 respondents for all six eating occasions. Among those, 105 items were consumed for breakfast (53 respondents), 31 items for mid-morning snacking (19 respondents), 205 for lunch (67 respondents), 30 for mid-afternoon snacking (20 respondents), 89 items for dinner (30 respondents), and 17 for late-night snacking (8 respondents). The food and beverage items were classified into 17 categories, with beverages divided into 8 sub-categories: alcoholic, chocolate drinks, coffee, shakes, soda, tea, water and unspecified. The number of food and beverage items per each category were computed into proportions by dividing by the number of total food and beverage items for each meal time (Table 2.2), for instance, for breakfast, the item per each category was divided by 105.

Foods for breakfast were mainly breakfast cereals, dairy and egg products, and baked products such as biscuit, toast or donuts. Coffee was the main drink for breakfast ($p<0.0001$). For lunch, respondents mainly consumed baked products (sandwiches, and bread), cereal grains (rice), pasta, vegetables and vegetable products. Water was chosen for lunch more than other beverages. For dinner, cereal grains and pasta ($p=0.0249$), vegetables and vegetable products ($p<0.0001$) were also the significant food categories. Alcoholic beverages, meanwhile, were consumed for dinner much more than for other meals ($p=0.0219$). Meats were also consumed more at dinner. Snacks, as expected, were the main food category for snack time, regardless morning, afternoon or late night ($p<0.0001$). Fruits and fruit juices were also consumed in these three snacking times ($p=0.0012$). However, nuts and seed products were preferred for mid-morning snacking more than the others ($p=0.0015$), while legumes and legume products (mostly peanuts and its products) were preferred for mid-afternoon and late-night snacking ($p=0.0009$). Sweets and fast foods were consumed much more for late-night snack than at other snack times.

Motivations for different eating occasions

Proportions test showed that the six investigated eating occasions did not differ from each other in the following motivations (significant level at $\alpha = 0.05$): Liking ($\chi^2 = 9.38$, df=5, $p=0.0947$), Pleasure ($\chi^2 = 8.52$, df=5, $p=0.1299$), Affect Regulation ($\chi^2 = 3.45$, df=5, $p=0.6306$), Social Image ($\chi^2 = 10.64$, df=5, $p=0.0589$), Visual Appeal ($\chi^2 = 5.64$, df=5, $p=0.3427$), and Variety Seeking ($\chi^2 = 10.63$, df=5, $p=0.0593$). Liking was measured by three subscales: “because I have an appetite for it”, “because it tastes good”, and “because I like it”. This confirmed that people ate what they liked, regardless of which meals or locations. Pleasure motivation was the combination of “because I enjoy it”, “in order to indulge myself”, and “in order to reward myself”. Among these three subscales, “because I enjoy it” was chosen the most as compared to

the other two. Affect regulation (sad, frustrated, lonely), Social Image (trendy, look good in front of others, others like it), and Visual Appeal (presentation is appealing, spontaneously appeals, recognized from an advertisement) had very low frequencies of responses (%) from all six meal times. Figure 2.4 shows the frequency of responses (%) of all 17 motivations for each eating occasion. This figure also shows the main trend of motivations associated to each eating occasion. Liking stood out as the main driver of food chosen for all eating. Choosing foods and beverages for regular meals, including breakfast, lunch, and dinner, appeared to be driven additionally by Habits (accustomed to eat it, usually eat it, familiar), Need and Hunger (need energy, pleasantly filling, hungry), Health (maintain balanced diet, healthy, keeps me in shape), Convenience (quick to prepare, most convenient, easy to prepare), and Price (inexpensive, don't want to spend more money, on sale).

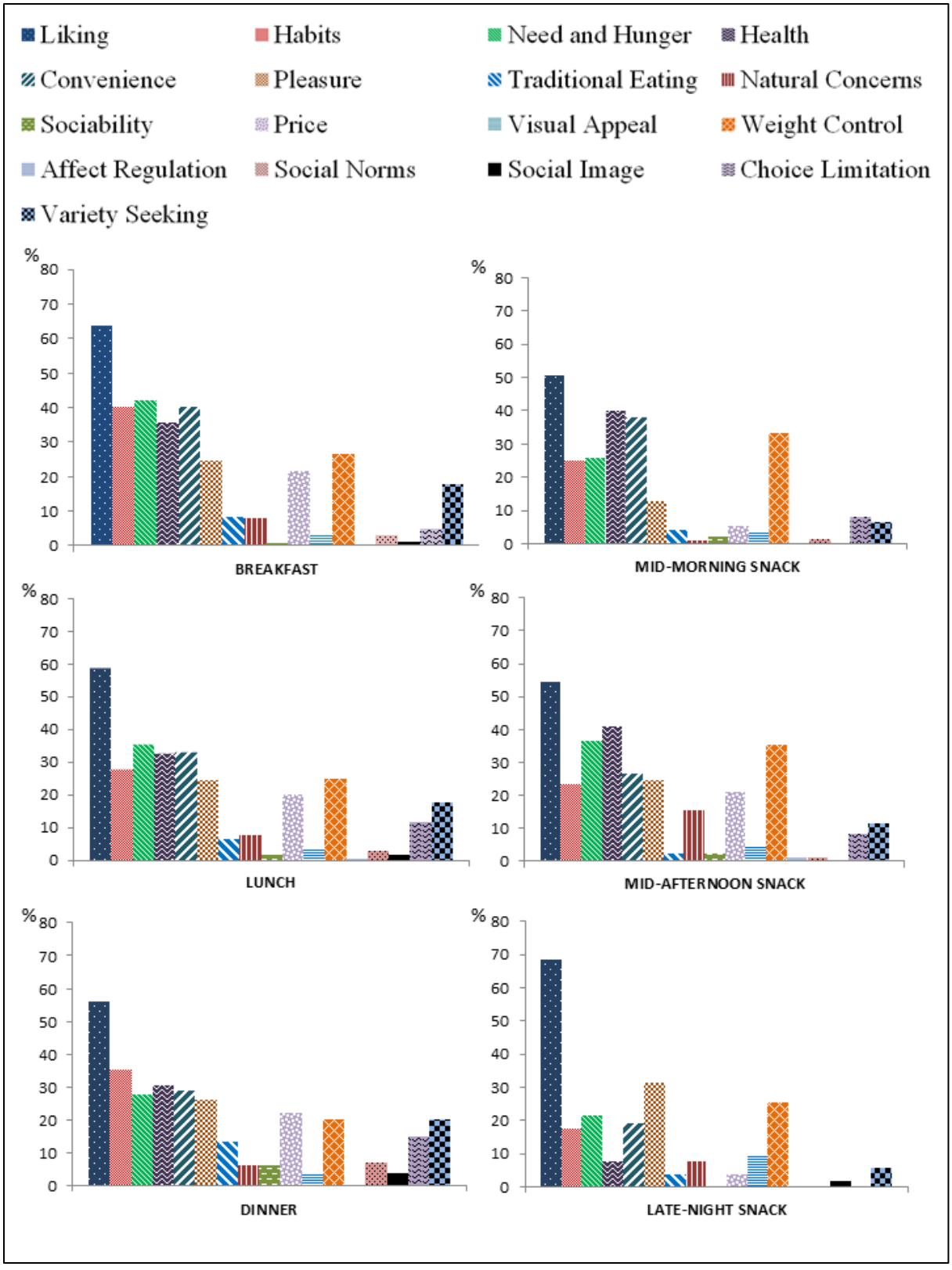


Figure 2.4 Frequency of responses (%) of 17 motivations for each eating occasion

Mid-morning snacking was driven by Liking, Health, Convenience, and Weight control (low in calories, weight watch, low in fat). People did not choose what to eat for morning snacking because of Habit or Hunger. However, they did pay attention to Weight Control when they decided what to munch on in the mid-morning. Motivation for afternoon snacking shared a similar pattern with mid-morning snacking, with the interplay of Liking, Need and Hunger, Health, Convenience, and Weight Control. Late-night snacking was the most different from the other two snacking in motivations. It was driven mainly by Liking, and Pleasure, and secondarily by Weight Control.

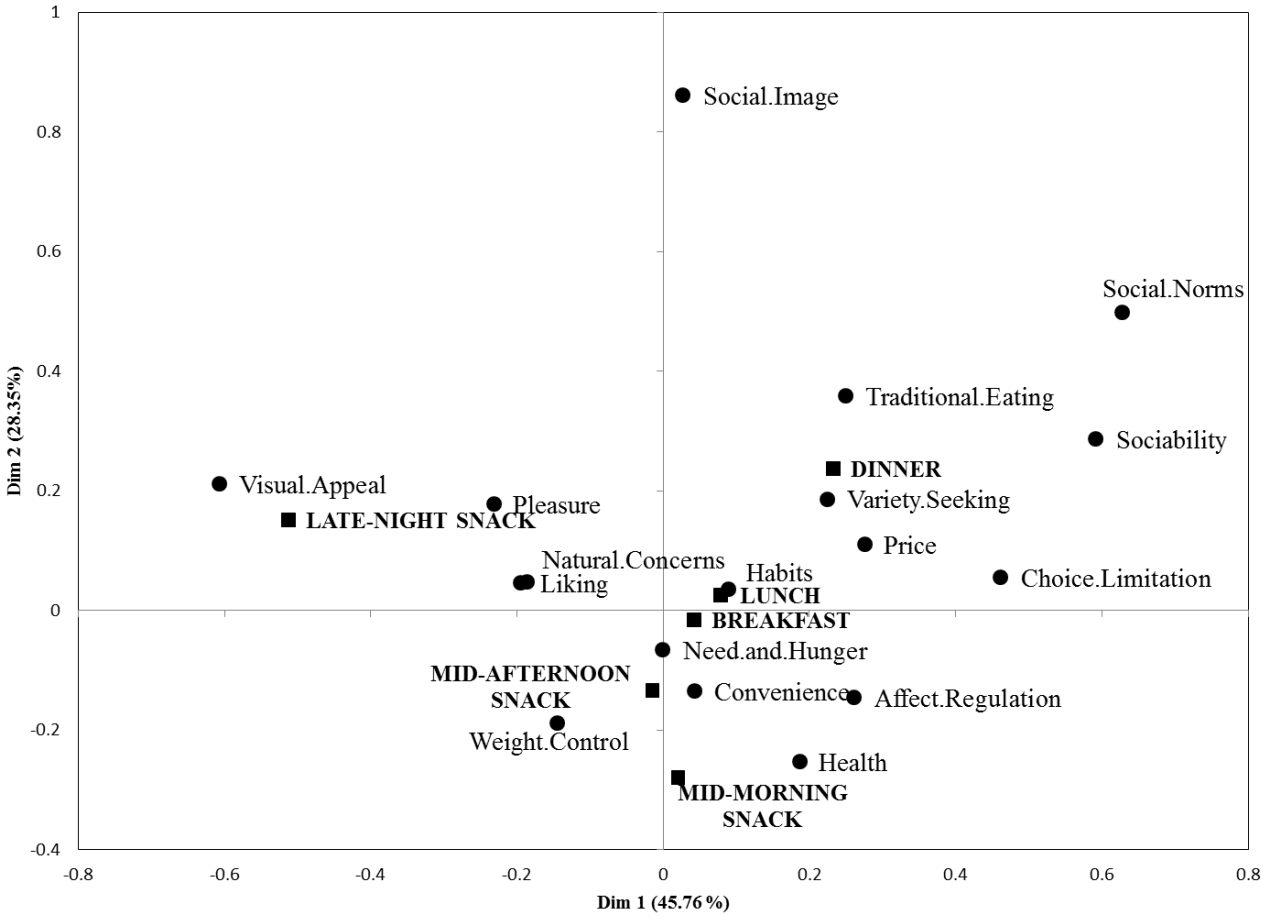


Figure 2.5 The Correspondence Analysis factor map represented six eating occasions and seventeen corresponding motivations. This factor map represented 74.11% of the total variance with factor 1 contributed 45.76% and factor 2 covered 28.35% of the variance.

The CA factor map helped extract motivations for each of the eating occasions from a multivariate perspective and confirmed the univariate results above (Figure 2.5). In addition to Liking, choosing foods for breakfast and lunch were driven more by Habits, Need and Hunger, and Convenience. Food choices for dinner were driven by Variety Seeking, Traditional Eating (belongs to certain situations, out of traditions, grew up with), and Sociability (social, spend time with others, makes social gatherings more comfortable). Choices for morning and afternoon snacks were made based on the concerns of Weight Control and Health, but late-night snack choices often were purely because of Pleasure and Visual Appeal. Social Norms (impolite not to eat, avoid disappointing someone, supposed to eat it) and Choice Limitation (only choice, what was served) were found to be more associated to dinner than the other contexts while Natural Concerns (natural, contains no harmful substances, organic) was a motivation for all eating occasions except mid-morning snacking.

Discussion

This study investigated the motivations underlying everyday food choice by looking at the motivations associated with specific choices of foods and beverages people consumed at various meal times. The findings provided strong support for the idea that people choose foods for different meals with different motivations. The drivers of consumption for breakfast, lunch, and dinner were the interplay of Need and Hunger, Convenience, Habits and Price (inexpensive). This was consistent with Rappoport, Downey and Huff-Corzine (2001) and den Uijil, Jager, de Graaf, Waddell, and Kremer (2014). For morning and afternoon snacking, people were more concerned about Health and Weight Control, but for late-night snacking, it was only Pleasure (enjoy and reward). Dinner was different from breakfast and lunch in Variety Seeking and Sociability. This was confirmed by the demographic results which indicated that people ate a

variety of food and beverage items for dinner (Figure 2.3) and more often they ate it with other people such as family and friends (Figure 2.2). Liking was found to be the most important driver of food and beverage consumption, regardless of meal, time, location and social settings. This confirmed a universal concept that people eat what they like. These results were quite different from the findings of Peters, Rappoport, Huff-Corzine, Nelsen and Downey (1995) who found that liking was heavily weighted for afternoon and evening meals but not breakfast.

The results of the study also showed strong difference in motivations between meals (breakfast, lunch, and dinner) and snacking. People consumed more foods and drinks for meals than for snacks and meals also had more variety of foods and drinks than snacks (Table 2.2). Meals were more social, snacks were often alone. This was consistent with Bisogni et al. (2007). There were fewer motivations associated with the choices for snacking, and people tended to snack on the same thing (Figure 2.4). den Uijil, Jager, de Graaf, Waddell, and Kremer (2014) reported that people consumed their main meals mainly to be "energized", "eat healthily", and "fulfill their physical needs", but "reward" was predominant for snack times. The findings of this study confirmed the patterns for meals, but explored that morning and afternoon snack were also driven by "being energized" and "eating healthily". This result was valid for the target population of the study, who were educated, employed/enrolled in school, and lived in a college town in the Midwest of the United States. These were people who spent most of their day in the offices or classrooms. When people were alone and engaged in other activities, they felt the need for nourishment or hydration to get them throughout the day. That's when 'snacks' occurred (Bisogni et al., 2007). Healthy-eating appeared to be related to the education levels and occupation domain of the respondents, who were mostly highly educated. Therefore, choices such as granola bars, fruits, fruit juices, yogurt, and cheese were mainly reported for daytime

snacking. However, when it came to late-night snacks, often at home, choices such as fries, chicken nuggets, chocolate, and cheese sticks were made. Given the energy-dense nature of these foods, late-night snacks had least to do with "eating healthy".

The breakfast pattern was found to be light, quick, at home and alone, mostly breakfast cereals, eggs, dairy, and coffee. This was very consistent with Chapman and Melton (1998), which reported the weekday breakfast patterns of North American were: cereal, toast, eggs, bacon and pancakes. The respondents consumed many sandwiches, rice, pasta and vegetables for lunch, which was consistent with Ahuja, Omolewa-Tomobi, and Moshfegh (2005). Lunch was either at home or at work, alone or with others. Dinner was found to be more of a social event, mostly at home, with a variety of foods and beverages, especially meats and alcohol. Daytime snacks were usually alone, at work, with less energy-dense foods. Late-night snacks were at home, alone or with others, and with 'pleasant' foods. These findings suggested that the intended meal time is a key factor that should be considered when developing and testing food and beverage products. For working people, food products for breakfast and lunch should be 'quick to prepare', 'providing energy', and 'at reasonable price'. Products for dinner should also consider those factors but 'more variety' such as adding different flavors would be appreciated. Snack products should be 'low in calories' but 'energizing'. For consumer testing purposes, products for morning eating should be tested in the morning time, and products for afternoon or evening should be tested in their corresponding time periods. From this study, it should be between 7-10 AM for morning eating, 11am to 3 pm for afternoon eating, 5-8pm for dinner and after 8pm for night snacking.

This study introduced a new way to investigate food choices. The method was based on one concept: capturing the motivations for a specific choice of a specific meal of a specific

participant. From those inputs, the motivations for larger categories of foods and consumers were generalized. For instance, consider the following data from one participant: female, 23-44 years old, US White-non Hispanic, full-time employed, and earning $25,001 to 49,999 annually. She chose hard-boiled eggs for her latest breakfast, which she ate alone at work, around 8-11 am. She reported choosing hard-boiled eggs because they are 'familiar', 'pleasantly filling', 'healthy', 'quick to prepare', 'easy to prepare', 'most convenient', 'indulgent', 'inexpensive', 'low fat' as well as 'quench appetite', 'taste good', 'contain no harmful substances'. It's also because she 'likes it', 'is accustomed to eat it', 'needs energy', 'is hungry', 'needs balanced diet', and 'enjoys eating it'. However, she also reported that 'someone made it' for her and it was 'the only choice'. From her input, twenty motivation subscales were recorded for hard-boiled eggs as well as twenty motivation subscales for the egg and dairy category and twenty motivation subscales were generated for breakfast. In short, this method allowed us to investigate the problems of interest at two levels: individual choice and group choice. This study is quite different from the typical consumer dietary surveys that gather information on what is eaten without understanding why those foods are eaten or surveys that determine dietary choices based on overarching general patterns of food choice without consideration of individual foods, occasions, and situational differences. This information about specific foods, meals, times, and occasions allow a bottom-up approach for improving food choices when needed.

Though this study extended the understanding of food choices within the context of particular eating occasions and provided new methodology to approach this complex issue, limitations of the study should be acknowledged. The participants were from a mix of ethnicities, but 88% were American White/Caucasian from a single Midwestern U.S. population. Therefore, there were not enough data to draw conclusions on the influences of ethnicities or culture on

people's motivations for choosing different foods for different meals. Besides, due to small sample sizes, the motivations for snacking, especially late-night snacks need further investigation.

Conclusions

The study confirmed that different motivations accounted for people's different food choices for different meals and eating events. Choosing foods for breakfast was motivated more by hunger and convenience than was dinner, for which people were more likely to seek variety and opportunities to socialize. Lunch was often eaten at work and shared similar motivations with breakfast. Snacks were different from meals both in motivations, number of food and beverage items and variety of food groups. Snacks in the daytime involved healthier choices and should meet the need for energy. Snacks in late-night were primarily for pleasure. However, liking was always the strongest motivation for food choices, regardless of eating occasions. This study also proposed a bottom-up approach to investigate food choices and issues related such as times, locations, and motivations. More applications of this approach will be presented in chapter 3.

Acknowledgements

This research project was supported by the Sensory Analysis Center at Kansas State University.

References

Ahuja, J. K. C., Omolewa-Tomobi, G. & Moshfegh, A. J. (2005). 'What we eat for "lunch" in America'. *Journal of American Dietetic Association, 105,* 24.

Bellisle, F., Dalix, A., Mennen, L., Galan, P., Hercberg, S., De Castro, J., & Gausseres, N. (2003). Contribution of snacks and meals in the diet of French adults: A diet-diary study. *Physiology & Behavior, 79*(2), 183-189.

Bisogni, C.A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J. & Devine, C. M. (2007). Dimensions of everyday eating and drinking episodes. *Appetite, 48*, 218-231.

Blake, C. E., Bisogni, C. A., Sobal, J., Devine, C. M. & Jastran, M. (2007). Classifying foods in contexts: How adults categorize foods for different eating settings. *Appetite, 49*, 500-510.

Blake, C. E., Bisogni, C. A., Sobal, J., Jastran, M. & Devine, C. M. (2008). How adults construct evening meals. Scripts for food choice. *Appetite, 51*, 654-662.

Chapman, G.E., and Melton, C. L. (1998). College and university students' breakfast consumption patterns: Behaviours, beliefs, motivations and personal and environmental influences. *Canadian Journal of Dietetic Practice and Research, 59*, 176-182.

den Uijl, L. C., Jager, G., de Graaf , C., Waddell, J. & Kremer, S. (2014). It is not just a meal, it is an emotional experience – A segmentation of older persons based on the emotions that they associate with mealtimes. *Appetite 83*, 287-296.

Husson, F., Josse, J., Lê, S., Mazet, J. (2007). FactoMineR: Factor Analysis and Data Mining with R. R package version 1.04, URL http://CRAN.R-project.org/package=FactoMineR

Meiselman, H. L. (2000). The meal: an integrative summary. In H.L. Meiselman (Ed.), *Dimensions of the meal: The science, culture, business and art of eating* (pp. 311–333). Gaithersburg, Maryland: Aspen Publishers, Inc.

Meiselman, L. H. (2007). The impact of context and environment on consumer food choice. In L. Frewer, & H. van Trijp (Eds.), *Understanding consumer of food products* (pp. 67-92). Boca Raton, FL: Woodhead Publishing Ltd and CRC Press LLC.

Meiselman, L. H. (2008). Dimensions of the meal. *Journal of Food Service, 19*, 13-21.

Meiselman, L., H. (2009). *Meals in science and practice. Interdisciplinary research and business applications*. Cambridge, England: Woodhead Publishing Limited.

Oltersdorf, U., Schlettwein-Gsell, D., & Winkler, G. (1999). Assessing eating patterns – an emerging research topic in nutritional sciences: introduction to the symposium. *Appetite, 32,* 1–7.

Peters, G.R., Rappoport, L. H., Huff-Corzine, L., & Downey, R.G. (1995). Food preferences in daily life: Cognitive, affective and social predictors. *Ecology of Food and Nutrition, 33*, 215-228.

Piqueras-Fiszman, B., & Jaeger, S. R. (2015). What makes meals 'memorable'? A consumer-centric exploration. *Food Research International, 76*, 233-242.

Rappoport, L., & Huff-Corzine, L. (2001). Conceptual difference between meals. *Food Quality and Preference*, *12*, 9-17.

Renner, B., Sproesser, G. Strohbach, S. & Schupp, H.T. (2012). Why we eat what we eat. The Eating Motivation Survey (TEMS). *Appetite 59*, 117-128.

Chapter 3 - Motivations for choosing various food groups: A bottom-up approach

Abstract

Understanding "why people eat what they eat" is important for improving the lives of people around the world by helping provide industrial and social solutions for people to have greater pleasure and health from the foods they choose. The objective of this study was to investigate the motivations behind everyday choices of different food groups using a bottom-up approach that targeted the specific choices of foods and beverages people consumed at various times of a day. This study was conducted using an online survey that included questions related to demographics, the most recent meal including specific food choices, and a slightly modified Eating Motivation Survey (2 motivations were added, and Check-All-That-Apply procedure was used), which contained 50 sub-scales to measure 17 motivations including such topics as Liking, Need and Hunger, Pleasure, Convenience, Health, Price, etc. A total of 198 participants completed the surveys. CATA data for motivations were analyzed by Correspondence Analysis. The results showed that Liking was the strongest motivation that drove people to select all sorts of foods. Need and Hunger and Convenience were the main motivations for baked products, "fast" foods, sausages and meats, and snack foods while Health and Weight Control were found to be the main driving factors for vegetables, fruits & fruit juices, nuts, seeds, dairy & egg, and poultry products. Sweets were linked to Pleasure. For beverages, people were motivated most by Health and Weight Control to choose water and tea. Coffee was used due to Habits; soda was because of Pleasure and alcoholic was for socialization purposes. This study provided developers, marketers, health educators, etc. with a new method to understand food choice in

order to promote better eating. The findings suggested that "healthier" alternatives for certain food items should be from the same food group with similar associated motivation.

Introduction

People's "personal food system" is driven both by the stable motivations such as preferences, cultural background, social norms, or attitudes and momentary motivations such as availability, mood, hunger, convenience or cost (Rozin, 2007). Knowledge of the motivations behind each food group and eating situation can help facilitate new food product development and better understand marketing (including social marketing for more healthful eating) of these new products. Understanding food choice is also beneficial for giving dietary advice to improve human and environmental health to prevent chronic diseases, especially when overweight and obesity and under-nutrition remain problems affecting quality of life (Kremer-Sadlik et al., 2015; Lyerly & Reeve, 2015; Renner, Sproesser, Strohbach, & Schupp, 2012). WHO pointed out that globally there has been an increase of energy-dense food intake and physical inactivity. Typically, dietary advice such as "you should/should not eat X because it is …" are often used in healthy eating research and education/intervention programs. For instance, it is easy to find statements such as "you should consume more fruits and vegetables because they are rich in fiber and low fat", or "you should eat lean poultry and fish because they are heart-healthy choices". Kremer-Sadlik et al. (2015) pointed out that though many of the intervention programs aimed at educating children through school curricula and adults through health care settings, none of those initiatives showed significant positive effect on consumption of fruits and vegetables.

Therefore, in light of the difficulty in modifying individuals' behavior through the current campaigns, it is critical to understand the factors that play a role in individuals' food choices and intake (Pomerleau, Lock, Knai, & McKee, 2005). Many different approaches have been

developed to investigate everyday food choice motives. These include the Food Choice Questionnaire (Steptoe, Pollard, & Wardle, 1995), the Ethical Food Choice Motives Questionnaire (Lindeman & Väänänen, 2000), the Health and Taste Attitudes Questionnaire (Roininen, Lähteenmäki, & Tuorila, 1999; Roininen & Tuorila, 1999), the Food Life Questionnaire (Rozin, Bauer, & Catanese, 2003), the Motivations to Eat Scale (Jackson, Cooper, Mintz, & Albino, 2003), the Food Choice Kaleidoscope (Jaeger, Bava, Worch, Dawson, & Marshall, 2011), and the Eating Motivation Survey (Renner et al., 2012). Among these, the Food Choice Questionnaire (FCQ) has been the most commonly used and adapted method in the food choice research domain (e.g. Pohjanheimo & Sandell, 2009; Pula, Parks, & Ross, 2014). However, there is always a need to modify and enhance the original FCQ as its original 9 categories and 36 items fail to capture some specific motives such as concern, religion, political values, and ethical concern (Ares & Gámbaro, 2007; Share & Stewart-Knox, 2012).The robustness of FCQ, furthermore, was not supported by the empirical data in Fotopoulos, Krystallis, Vassallo, and Pagiaslis (2009). Findings of Eertmans, Victoir, Vansant, and Van den Bergh (2005) also raised the question about the generalizability of the FCQ's factor structure. Meanwhile, the Eating Motivation Survey (TEMS), as a relatively new method, attempts to capture a wide-range of motives underlying eating behavior. This questionnaire has been proved to be a comprehensive measurement of why people eat what they eat.

This study employed the brief version of TEMS but the approach is quite different from the typical consumer dietary surveys that gather information on what is eaten without understanding why those foods are eaten or surveys that determine dietary choices based on overarching general patterns of food choice without consideration of individual foods, occasions, and situational differences, such as Kang, Jun, and Arendt (2015) or Lyerly and Reeve (2015).

Instead, this study proposed a bottom-up approach that was to capture the motivations for a specific choice of a specific food group of a specific participant. From those inputs, the motivations for larger categories of foods and consumers can be generalized. For instance, there may be a participant who is a woman, US White-non Hispanic, 18-32 years old, full-time employed, and earned $50,000 to 99,999 annually. She chose baked tilapia, for her latest lunch, which she ate alone at work, around 11:30 am. She may report choosing tilapia because she liked it, and it's convenient, healthy, and inexpensive. From her input, we have four motivations for tilapia as well as four motivations for the fish and seafood category. In short, this approach allowed us to investigate the problems of interest at two levels: individual choice and group choice. This information about specific foods, meals, times, occasions, and choice reasoning allows a bottom-up approach for changing food choices when needed.

Materials and Methods

Participants

To participate in the study, people have to be older than 18 years old and have lived in the United States for more than 10 years. Students, faculty, and staffs of Kansas State University who were interested in the study were invited to take an online screener to examine their qualification for the study. A total of 204 people were recruited, but only 198 have completed the online survey and were paid $10 for their time. Among 198 respondents, there were 162 females and 36 males whose age were between 18 and 74 and mainly resided in Manhattan, Kansas. Eighty nine percent of the respondents were White/Caucasian. About 41% had annual income below $50,000 and about one third of the respondents had annual income between $50,000 and $99,999. About 90% of the respondents were employed, with 56% full time and 32% part time. Fifty eight percent of the respondents were not full time students.

Online survey questionnaire

Qualified participants were asked to complete an online survey operated in Qualtrics software (Qualtrics, Provo, UT, USA) licensed for Kansas State University. The survey questionnaire has been reviewed and approved by the Internal Review Board of Kansas State University. The respondents first answered demographic questions, including sex, race/ethnicity, residency, occupation, and income. They were then asked to indicate their most recent meal by choosing from a list of seven options: breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, late-night snack and other (specify…). The respondents then provided details about that meal including how many food/beverage items were consumed, what the food/beverage items were, and the alternative options they had at that time. Then for each food/beverage item specified, the respondent used the brief version of The Eating Motivation Survey (TEMS) adapted from Renner et al. (2012) to provide the reasons for choosing that item. TEMS, however, was modified to serve the purpose of this study by adding two more motivation constructs, Variety Seeking and Choice Limitation, to make it a total of 17 motivation constructs and using Check-All-That-Apply (CATA) instead of rating scale. TEMS used 50 subscales to measure the 17 motivations, with 3 subscales per one motivation, except for Convenience (4 subscales), Choice Limitation and Variety Seeking (2 subscales). Figure 3.1 shows the modified TEMS used in this study.

Liking	**Sociability**
because I have an appetite for it	because it is social
because it tastes good	so that I can spend time with other people
because I like it	because it makes social gatherings more comfortable
Habit	**Price**
because I'm accustomed to eating it	because it is inexpensive
because I usually eat it	because I don't want to spend any more money
because I am familiar with it	because it is on sale
Need and Hunger	**Visual Appeal**
because I need energy	
because it is pleasantly filling	

because I'm hungry

Health

to maintain a balanced diet
because it is healthy
because it keeps me in shape (e.g. energetic, motivated)

Convenience

because it is quick to prepare
because it is the most convenient
because it is easy to prepare
because someone made it for me and it is the choice

Pleasure

because I enjoy it
in order to indulge myself
in order to reward myself

Traditional Eating

because it belongs to certain situations
out of traditions (e.g. family traditions, special occasions)
because I grew up with it

Natural Concerns

because it is natural (e.g. not genetically modified)
because it contains no harmful substances (e.g. pesticides, pollutants, antibiotics)
because it is organic
because the presentation is appealing (e.g. packaging)
because it spontaneously appeals to me (e.g. situated at eye level, appealing colors)
because I recognize it from advertisements or have seen it on TV

Weight Control

because it is low in calories
because I watch my weight
because it is low in fat

Affect Regulation

because I am sad
because I am frustrated
because I feel lonely

Social Norms

because it would be impolite not to eat it
to avoid disappointing someone who is trying to make me happy
because I am supposed to eat it

Social Image

because it is trendy
because it makes me look good in front of others
because others like it

Choice Limitation

because it was what was served
because it is the only choice

Variety Seeking

because I like to eat a variety of different foods each day
because I don't like to eat the same food for the same meal everyday

Figure 3.1 The modified version of The Eating Motivation Survey used in this study. This questionnaire included 50 motivation subscales measuring 17 motivation constructs

.

Data analysis

The food items were classified into different food groups, such as egg and dairy, fruits and fruit juices, or beef products based on the National Nutrient Database for Standard Reference Release 27 of USDA (http://ndb.nal.usda.gov/ndb/foods). CATA count data collected from 50

TEMS subscales was grouped into 17 motivation factors for each food group. The count data for these 17 factors were then computed into proportions to remove the effect of sample size due to the difference among the numbers of responses for each of the food groups. The motivation proportion data were linked to the food groups using Correspondence Analysis (CA) in FactoMineR package (Le, Josse, & Husson, 2008) to explore the main motivations underlying each food group. Hierarchical Clustering was also performed on the CA factors to examine the differences/similarities in motivations among the food groups. Proportion tests using Pearson's chi-squared test statistic were also performed on the data to validate the main motives for each food group. All analysis was performed in R 3.0.1 (R Development Core Team, 2007).

Results

A total of 477 food and beverages items were reported from 198 respondents for all six eating occasions. Seventy items were identified to be baked products, including food items such as toast, corn bread, sandwiches, donuts, cinnamon roll and so on. Among these, 22 items were for breakfast, 3 for mid-morning snacking, 34 for lunch, 3 for mid-afternoon snacking, 7 for dinner, and 2 for late-night snack. Ninety two items were beverages, including 3 alcoholic, 17 coffee, 14 soda, 8 tea, 43 water, and 7 other. All alcoholic beverages were consumed at dinner, while coffee were mostly drunk at breakfast. Water, soda, and tea were used at all six eating occasions. Fourteen items were breakfast cereals, such as oatmeal, cereal mix, and granola cereal. This group was mostly consumed at breakfast. Cereal grains and pasta group contained 15 items, consisting of foods such as brown seasoned rice, spaghetti, pasta, white rice, and instant rice. This group was consumed at lunch and dinner. Dairy and egg food group contained 50 items such as scrambled egg, hard-boiled egg, yogurt, milk, or cheese. This group was mainly consumed for meals, not much for snacking. Fast foods group was reportedly consumed much

for lunch and dinner, consisting of 19 items such as cheeseburger, pizza, fries, nachos, or chicken tenders. Another 60 items were classified into fruits and fruit juices. This group was consumed at all meals and snacks and contained items such as banana, orange, grapefruit, apple, fruit salad, or orange juice. Nuts, seeds and legumes group had 13 items. Twelve items belonged to the poultry group, and 11 were sausages and luncheon meats. These two groups were for lunch and dinner. Another large group was snack foods, which contained 41 items total, such as protein bars, chips, pretzels, fruit snacks, or rice crackers. Sweets, including items such as ice cream, chocolate, or pudding, contained 12 items. Vegetables and vegetable products was another large group, which consisted of 42 food items such as lentils, salad, carrots, potatoes, green beans, or corn. This group was consumed at either lunch or dinner, but not at any other eating times. There were 26 items classified as meals, soups and side dishes. This group contained combination of food items that could not be separated into other individual groups due to the fact that the respondents reported it as a whole. For instance, breakfast burritos made of egg, sausage, cheese and corn wraps, or eggplant curry, or cheese pizza rolls with water and fake meat sausage patties.

Motivations for fourteen different food groups

Figure 3.2 provided the motivations associated with the fourteen food groups of interest. These fourteen food groups were grouped into three clusters due to their similarity in motivation patterns. Cluster 1 included fast foods, sausages & meats, baked products, cereal grains & pasta, and snack foods. These groups were overall associated with Liking, Convenience and Need and Hunger. Table 3.1 presented the responses (%) for each motivation for each food group in this cluster. People appeared not to care much about Health or Weight Control or if the foods containing natural substances or not when choosing food items in these groups for their eating. They did not choose these foods just to socialize with others or because they were sad or lonely.

Visual Appeal was not a concern either. Snack foods were chosen mostly because people liked them or because they needed energy, and eating for variety was not a concern for snack foods. The representative detailed motivation pattern of these groups was presented in Figure 3.3a, which was the pattern of baked products.

Cluster 2 consisted of eight food groups, i.e. breakfast cereals, nuts, seeds & legumes, dairy & eggs, fruits & fruit juices, vegetables, poultry products, beverages (47% water, 18% coffee, 15% soda, 9% tea, 3% alcoholic, 8% other), and meals, soup & side dishes. People were more likely to choose foods and drinks from these food groups because of Weight Control, Health, and Natural Concerns (Figure 3.2). The motivation responses (%) of these groups were presented in Table 3.2. The response patterns showed that Liking, Need and Hunger, and Convenience were also the main drivers of consumption for these food groups, and the food items in these groups were not consumed because of socialization purposes or moods or visual appeal. Figure 3.3b showed the motivation pattern of dairy and egg products, which was a representative for cluster 2. Meanwhile, sweets (cluster 3) were chosen mainly because of Pleasure, Choice Limitation, and Liking (Figure 3.3c). Other motivations were not important for people when choosing items in this food group.

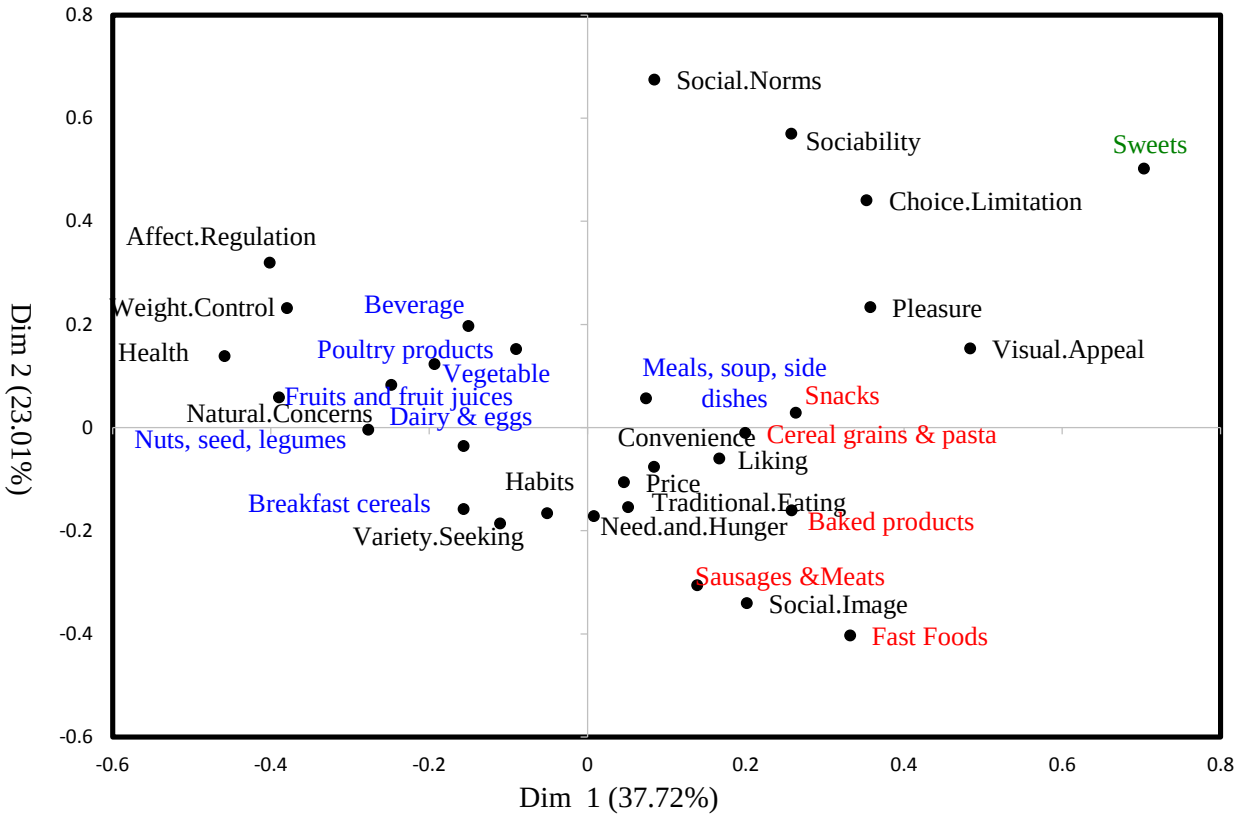


Figure 3.2 The CA factor map of fourteen food groups and seventeen motivations. This map represented 60.73% of the total variance. Hierarchical clustering was performed on the factor map to group these 14 food groups into 3 groups: group 1 consisted of fast foods, sausages & meats, baked products, cereal grains & pasta, and snack foods (in red color); group 2 included breakfast cereals, nuts, seeds & legumes, dairy & eggs, fruits & fruit juices, vegetables, poultry products, beverages, and meals, soup & side dishes (in blue color); group 3 contained only sweets (in green color).

Table 3.1 The motivation responses (%) for cluster 1, including baked products, grains & pasta, fast foods, sausages & meats, and snack foods.

Food group	Baked products	Grains & pasta	Fast Foods	Sausages & Meats	Snack foods
Liking	52.86	55.56	64.91	51.52	36.59
Habits	25.71	35.56	33.33	33.33	17.89
Need & Hunger	32.86	35.56	38.60	39.39	30.08
Health	11.90	13.33	5.26	12.12	11.38
Convenience	34.29	41.67	35.53	22.73	27.44
Pleasure	24.29	28.89	19.30	18.18	24.39
Traditional Eating	7.62	17.78	7.02	12.12	2.44
Natural Concerns	2.38	11.11	0.00	6.06	1.63
Sociability	0.95	8.89	0.00	0.00	2.44
Price	18.57	17.78	19.30	21.21	11.38
Visual Appeal	5.24	0.00	7.02	0.00	4.88
Weight Control	6.19	13.33	0.00	9.09	12.20
Affect Regulation	0.00	0.00	0.00	0.00	0.00
Social Norms	0.95	4.44	0.00	0.00	0.00
Social Image	0.48	6.67	1.75	9.09	1.63
Choice Limitation	8.57	20.00	0.00	9.09	9.76
Variety Seeking	17.86	23.33	15.79	18.18	4.88

Notes: Except for Convenience, Choice Limitation, and Variety Seeking, the sample sizes for the other motivations were: baked products (N=210), grains & pasta (N=45), fast foods (N=57), sausages & meats (N=33), snacks (N=123). For Convenience, the sample sizes were: baked products (N=280), grains & pasta (N=60), fast foods (N=76), sausages & meats (N=44), snacks (N=164). For Choice Limitation and Variety Seeking, the sample sizes were: baked products (N=140), grains & pasta (N=30), fast foods (N=38), sausages & meats (N=22), snacks (N=82).

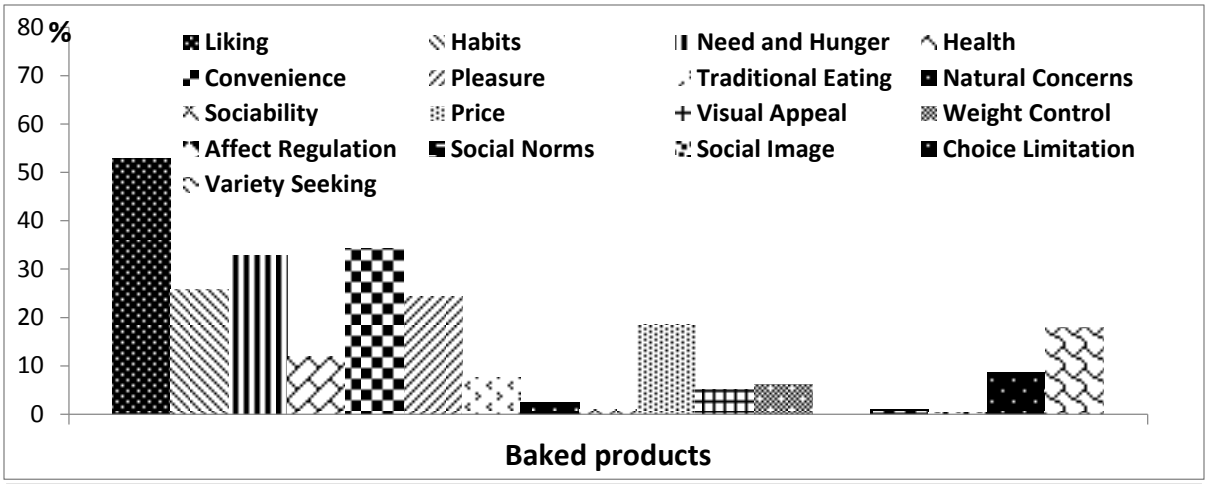
.

Table 3.2 The motivation responses (%) for cluster 2, including beverages, cereals, dairy & egg products, meals, soup & sides, poultry, and vegetables.

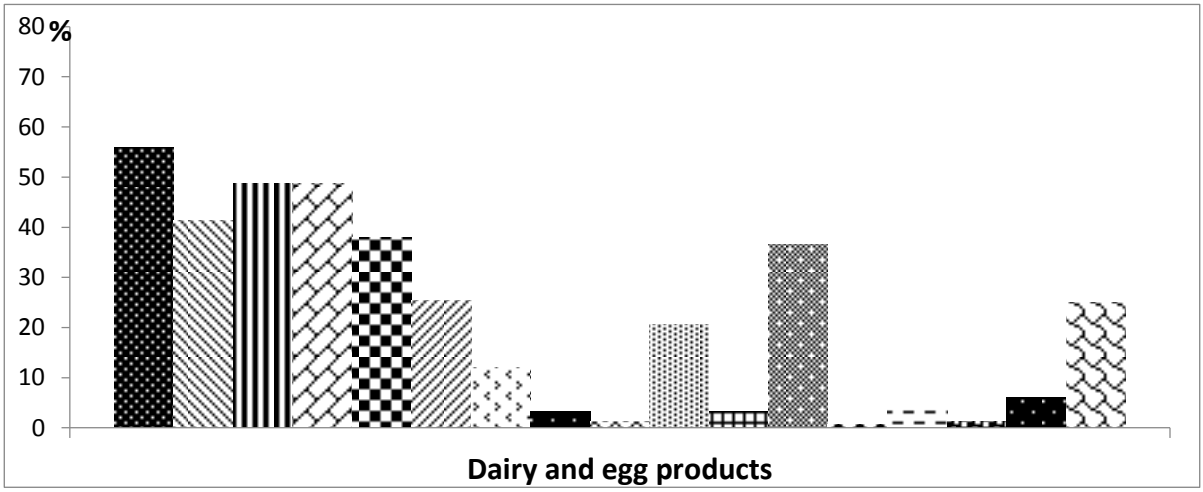
Food group	Beverage	Cereals	Dairy & Eggs	Fruits & fruit juices	Meals, soup, side dishes	Nuts, seeds, legumes	Poultry	Vegetables
Number of items (N)[a]	92	14	50	60	26	13	12	42
Liking	47.83	64.29	56.00	58.33	47.44	56.41	50.00	47.62
Habits	32.25	59.52	41.33	31.67	20.51	41.03	30.56	34.13
Need & Hunger	18.84	71.43	48.67	36.11	37.18	38.46	50.00	39.68
Health	35.51	50.00	48.67	53.89	25.64	56.41	52.78	55.56
Convenience	25.00	57.14	38.00	33.75	44.23	38.46	33.33	34.52
Pleasure	25.72	23.81	25.33	23.33	19.23	20.51	27.78	21.43
Traditional Eating	7.25	11.90	12.00	4.44	5.13	7.69	13.89	8.73
Natural Concerns	13.04	16.67	3.33	7.78	7.69	17.95	8.33	11.90
Sociability	3.62	0.00	1.33	1.67	2.56	0.00	11.11	1.59
Price	20.65	26.19	20.67	17.78	33.33	10.26	25.00	21.43
Visual Appeal	3.99	7.14	3.33	2.22	2.56	2.56	5.56	2.38
Weight Control	34.78	40.48	36.67	41.67	16.67	28.21	38.89	37.30
Affect Regulation	0.36	0.00	0.67	1.11	1.28	0.00	0.00	0.00
Social Norms	5.80	0.00	4.00	3.33	6.41	2.56	5.56	5.56
Social Image	1.45	2.38	1.33	0.00	1.28	0.00	5.56	3.97
Choice Limitation	4.89	7.14	6.00	8.33	19.23	3.85	20.83	22.62
Variety Seeking	3.26	28.57	25.00	25.83	17.31	11.54	29.17	27.38

[a] Except for Convenience, Choice Limitation, and Variety Seeking, the sample sizes for the other motivations were equal the number of food items for each food group (N) times 3. For instance, the sample size for Liking of beverage equal 92 times 3 equal 276. For Convenience, the sample size was Nx4. Choice Limitation and Variety Seeking had sample size equal Nx2.

3a



3b



3c

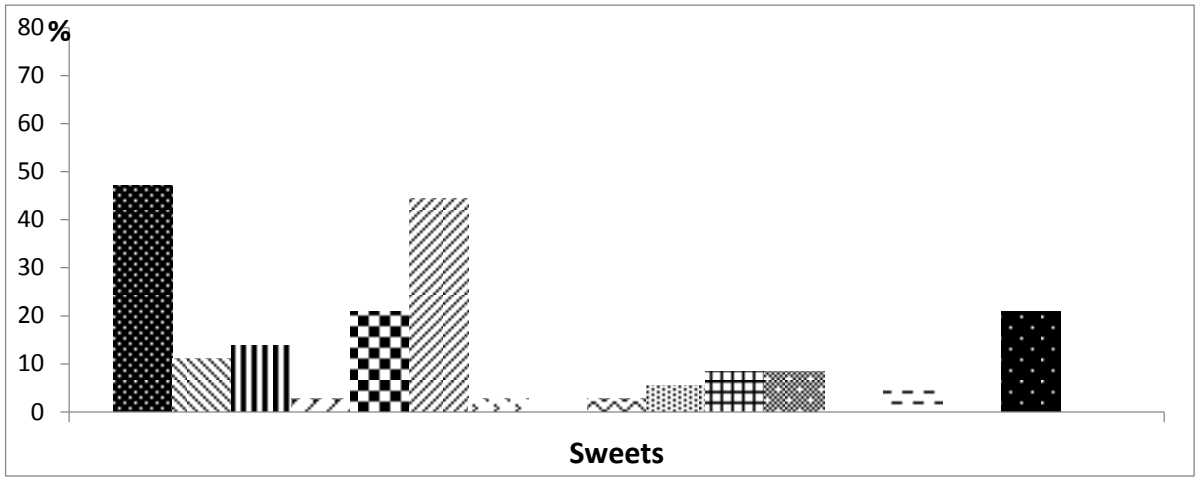


Figure 3.3 Representative motivation patterns (%) for three clusters of food groups. 3a) This motivation pattern was associated with baked products, snack foods, cereal grains and pasta, sausages and luncheon meats, and fast foods (table 3.1). 2b) This motivation pattern was for dairy and egg products, breakfast cereals, nuts, seeds, and legumes, fruits and fruit juices, vegetables and vegetable products, poultry products and beverages (table 3.2). 2c) This motivation pattern was only for sweets. Motivation patterns for other food groups could be found in Appendix D.

Motivations associated with beverages

The beverage group included 92 items, classified into 7 sub-groups, i.e. water, tea, coffee, soda, alcoholic beverages, nutritious drinks and non-calorie drinks. Due to the differences in the numbers of items per sub-group, the motivation responses for these sub-groups were also transformed into proportions to eliminate the effect of sample sizes before performing correspondence analysis on these data. Figure 3.4 showed the motivations associated with each beverage. Together with the motivation response patterns (%) shown in Table 3.3, the CA results showed that water and tea were linked to Need and Hunger, Habits, Health, Natural Concerns, Convenience and Weight Control. However, tea was consumed also because of Pleasure. People drank coffee mostly due to Habits. Soda was linked to Pleasure while low-calorie drinks were chosen due to Price (low cost) and Choice Limitation. Nutritious drinks were associated with Health and Weight Control. Alcoholic beverages were consumed because of Pleasure, Visual Appeal, and Sociability. Liking, again, was found to be the main drivers of consumption for all kinds of beverages, especially stronger for alcoholic, soda, low-calorie drinks.

Table 3.3 Motivation patterns (%) of different beverage categories

Beverage	Low-calorie drinks	Nutritious drinks	Alcoholic	Coffee	Soda	Tea	Water
Number of items (n)	3	4	3	17	14	8	43
Liking	66.67	41.67	66.67	49.02	50.00	58.33	42.64
Habits	0.00	41.67	0.00	39.22	30.95	45.83	31.01
Need and Hunger	0.00	33.33	0.00	25.49	16.67	12.50	19.38
Health	0.00	50.00	0.00	3.92	0.00	41.67	62.02
Convenience	25.00	31.25	0.00	25.00	17.86	37.50	26.16
Pleasure	22.22	8.33	33.33	19.61	38.10	37.50	23.26
Traditional Eating	0.00	16.67	0.00	9.80	7.14	4.17	6.98
Natural Concerns	0.00	0.00	0.00	3.92	0.00	20.83	22.48
Sociability	0.00	0.00	33.33	3.92	0.00	0.00	3.88
Price	33.33	16.67	11.11	11.76	11.90	16.67	27.91
Visual Appeal	0.00	0.00	33.33	5.88	9.52	0.00	0.78
Weight Control	44.44	50.00	0.00	21.57	23.81	37.50	43.41
Affect Regulation	0.00	0.00	0.00	0.00	0.00	0.00	0.78
Social Norms	0.00	0.00	0.00	1.96	0.00	0.00	11.63
Social Image	0.00	0.00	22.22	1.96	0.00	0.00	0.78
Choice Limitation	16.67	0.00	0.00	2.94	7.14	0.00	5.81
Variety Seeking	0.00	0.00	16.67	0.00	10.71	6.25	1.16

* The sample size for Convenience was nx4. Choice Limitation and Variety Seeking had sample size equal nx2. The sample sizes for the other motivations were nx3.

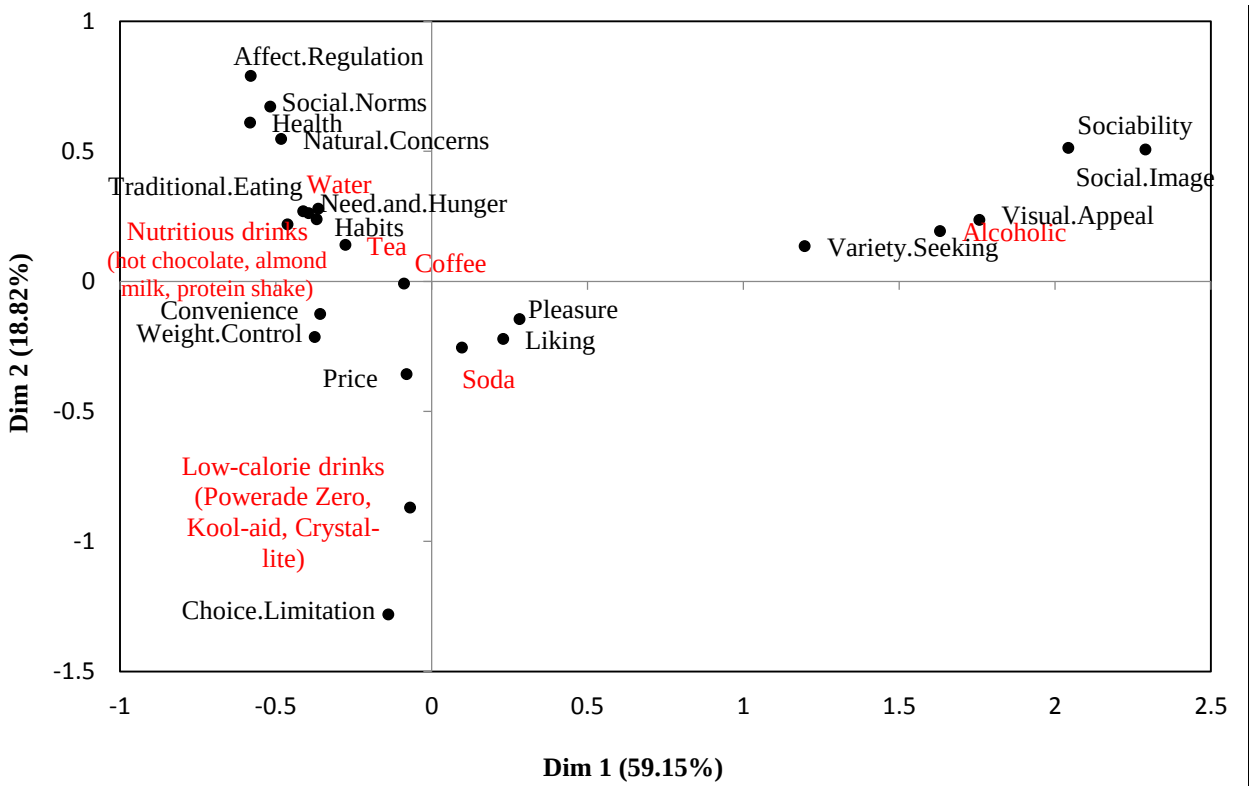


Figure 3.4 The CA factor map of motivations for different beverages. This map presented 77.97% of the total variance.

Discussion

The findings of this study confirmed that different motivations were responsible for choices of different food groups. While Liking was still the key motivation, Health, Weight Control, and Natural Concerns were found to be the main drivers of consumption of food items such as dairy and egg products, vegetables, nuts, seeds, legumes, or fruits and fruit juices. Convenience, Need and Hunger were what drove people to consume more fast foods, snack foods, meats and baked products. Eating sweets was mainly a result of Pleasure. Different kinds of beverages were also associated with different motivations. Water and tea were linked to Health and Weight Control. Coffee was consumed mainly as a habit, while soda and alcoholic were due to Pleasure. Alcoholic beverages were also consumed for socialization purposes.

The results of this study confirmed a universal agreement that people eat what they like, as Liking was among the dominant motivation factors of all food groups. Foods originated from dairy, egg, vegetables, nuts, seeds, and fruits were perceived as "healthy", given that people chose them because of Health, Weight Control and Natural Concerns. Eikenberry and Smith (2004) confirmed that fruits and vegetables were the most frequently offered definition of healthful eating. Consumption of fruits and vegetables were widely accepted as healthful eating (Kremer-Sadlik et al., 2015; Zandstra, De Graaf, & Van Staveren, 2001). Foods that are low in fat, sugar, sodium or calorie are also perceived as healthy (Kang et al., 2015). That many of the food items in the above food groups were low in fat and calories supported the validity of the findings as well as the approach of the study. It's feasible and valid to generate the motivations for bigger food categories from individual motivations of specific choices.

Higher calorie foods such as baked products, fast foods, sausages and meats, or snack foods were found to be consumed because of Convenience, and Need and Hunger. It's no doubt that fast foods have become a part of American life. Besides teenagers, young adults or family, even senior citizens were found to frequently dine at fast food restaurants for convenience and economics (Morris, Schneider, & Macey, 1996). People would argue why baked products were eaten because of convenience. Baking might be time consuming in some food cultures, but in the United States, thanks to a variety of ready-made baked goods (such as toasts, sandwiches, pancakes, muffins) or pre-made mixes of various baked products (such as bread, muffin, cake mix and so on), baking has become an easy and less time consuming food preparation method. Sausages and luncheon meats that were reported in this study were all ready-to-eat meats such as sausage patties, sausage links, and roast beef. Therefore, Convenience was an expected motivation for this group, so as snack foods, given this group always consists of ready-to-eat

items such as chips, granola bars, fruit snacks, crackers, etc. Due to their high-calorie nature, these groups of food items definitely satisfied people's need of energy. This, again, confirmed the validity of the approach.

Three clusters of food groups were different in motivation patterns. Overall, the healthier groups were linked to health and weight control; the higher-calorie groups were associated with energy and convenience; and the sweets group was the "pleasure" group. These were the main motivational differences between these three clusters of food groups. Cluster 1 and cluster 2, however, were somehow closer in motivations. People chose foods from these two clusters because of Habits, Convenience, Price, and Variety Seeking. However, people were motivated by Price more for the high calorie group than for the healthy group (Figure 3.2). Price was measured by three sub-scales: "inexpensive", "on sale", and "don't want to spend more money". This showed that the high-calorie food groups were mostly cheaper than the healthy food groups. This was consistent with previous studies confirming that healthy foods such as fruits and vegetables are costly, which created a barrier for healthy eating (Cassady, Jetter, & Culp, 2007; Eikenberry & Smith, 2004; Hough & Sosa, 2015). Therefore, making healthy foods less expensive would be a significant incentive for improving people's eating behavior.

The sweets group was different from the other groups. People consumed sweets mainly because they "enjoy eating it" and they "like it". Pleasure and Liking together shaped the motivation pattern for this food group, and it was nowhere close to Health (Figure 3.2). Sweets appeared to be indulgent food items and a part of daily meals because most items were reported to be eaten during lunch time, but occasionally at dinner or late-night snacking. Therefore, telling people sweets are not good for health is not necessary because people already know. Instead, to

improve people's diets, intervention programs should advise on the amount and time to consume those foods.

Even with a small sample size, beverages showed meaningful motivation patterns. Water and tea were a part of daily diet because they were "healthy". The results revealed that the target population was a health-oriented population, given that water was the main drink of all meals and eating events. Even when choosing soda, people chose the diet versions. Out of 477 food items reported in the study, 44.65% were low-calorie food items belonging in vegetables, fruits, dairy, poultry, water, and tea. This, again, showed that the target population was very health conscious. Drinking soda because of pleasure and liking, as well as, using alcoholic beverages for socializing with others were expected results. Coffee is often considered a stimulating drink or awakening drink, but from this study, coffee seemed to become a habit, not just a drink in people's everyday diets.

Every research has limitations. This study's limitation was its unequal sample sizes of the food groups collected. Therefore, for those food groups with quite small sample size, the findings should be considered preliminary results and further investigation are needed. These further results are reported in chapter 4 using a different research method but based on the same concept of bottom-up approach. Besides, the findings of the study were only valid for the population indicated in the study. Ethnicities should be taken into account in future study.

Conclusions

The study confirmed that, in addition to liking, other motivations have come to play in people's everyday food decisions with different levels of importance, depending on the food categories. People's "personal food system" was influenced by motivations such as preferences, hunger, convenience, health, cost or pleasure. Knowledge of the motivations behind each food

group and eating situation could help the product developers, marketers, health educators, etc. to work with each other to promote better eating. However, any modified alternative of any food item should meet the same motivation need with the original to be an acceptable replacement in people's everyday diets.

Acknowledgements

This research project was supported by the Sensory Analysis Center at Kansas State University.

References

Ares, G., & Gámbaro, A. (2007). Influence of gender, age and motives underlying food choice on perceived healthiness and willingness to try functional foods. *Appetite, 49*, 148-158.

Cassady, D., Jetter, K. M., & Culp, J. (2007). Is price a barrier to eating more fruits and vegetables for low-income families? *Journal of the American Dietetic Association, 107*, 1909-1915.

Eertmans, A., Victoir, A., Vansant, G., & Van den Bergh, O. (2005). Food-related personality traits, food choice motives and food intake: Mediator and moderator relationships. *Food Quality and Preference, 16*, 714-726.

Eikenberry, N., & Smith, C. (2004). Healthful eating: Perceptions, motivations, barriers, and promoters in low-income Minnesota communities. *Journal of the American Dietetic Association, 104*, 1158-1161.

Fotopoulos, C., Krystallis, A., Vassallo, M., & Pagiaslis, A. (2009). Food choice questionnaire (FCQ) revisited. suggestions for the development of an enhanced general food motivation model. *Appetite, 52*, 199-208.

Hough, G., & Sosa, M. (2015). Food choice in low income populations – A review. *Food Quality and Preference, 40*, 334-342.

Jackson, B., Cooper, M. L., Mintz, L., & Albino, A. (2003). Motivations to eat: Scale development and validation. *Journal of Research in Personality, 37*, 297-318.

Jaeger, S. R., Bava, C. M., Worch, T., Dawson, J., & Marshall, D. W. (2011). The food choice kaleidoscope. A framework for structured description of product, place and person as sources of variation in food choices. *Appetite, 56*, 412-423.

Kang, J., Jun, J., & Arendt, S. W. (2015). Understanding customers' healthy food choices at casual dining restaurants: Using the Value–Attitude–Behavior model. *International Journal of Hospitality Management, 48*, 12-21.

Kremer-Sadlik, T., Morgenstern, A., Peters, C., Beaupoil, P., Caët, S., Debras, C., & le Mené, M. (2015). Eating fruits and vegetables. An ethnographic study of American and French family dinners. *Appetite, 89*, 84-92.

Le, S., Josse, J., & Husson, F. (2008). FactoMineR: An R package for multivariate analysis. *Journal of Statistical Software, 25*, 1-18.

Lindeman, M., & Väänänen, M. (2000). Measurement of ethical food choice motives. *Appetite, 34*, 55-59.

Lyerly, J. E., & Reeve, C. L. (2015). Development and validation of a measure of food choice values. *Appetite, 89*, 47-55.

Morris, J., Schneider, D., & Macey, S. M. (1996). A survey of older Americans to determine frequency and motivations for eating fast food. *Journal of Nutrition for the Elderly, 15*(1), 1-12.

Pohjanheimo, T., & Sandell, M. (2009). Explaining the liking for drinking yoghurt: The role of sensory quality, food choice motives, health concern and product information. *International Dairy Journal, 19*, 459-466.

Pomerleau, J., Lock, K., Knai, C., & McKee, M. (2005). Interventions designed to increase adult fruit and vegetable intake can be effective: A systematic review of the literature. *The Journal of Nutrition, 135*, 2486-2495.

Pula, K., Parks, C. D., & Ross, C. F. (2014). Regulatory focus and food choice motives. Prevention orientation associated with mood, convenience, and familiarity. *Appetite, 78*, 15-22.

R Development Core Team. (2007). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing.

Renner, B., Sproesser, G., Strohbach, S., & Schupp, H. T. (2012). Why we eat what we eat. The eating motivation survey (TEMS). *Appetite, 59*, 117-128.

Roininen, K., Lähteenmäki, L., & Tuorila, H. (1999). Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite, 33*, 71-88.

Roininen, K., & Tuorila, H. (1999). Health and taste attitudes in the prediction of use frequency and choice between less healthy and more healthy snacks. *Food Quality and Preference, 10*, 357-365.

Rozin, P. (2007). Food choice: An introduction. In L. Frewer, & H. van Trijp (Eds.), *Understanding consumers of food choice* (pp. 3-29). Boca Raton, FL: Woodhead Publishing Ltd and CRC Press LLC.

Rozin, P., Bauer, R., & Catanese, D. (2003). Food and life, pleasure and worry, among American college students: Gender differences and regional similarities. *Journal of Personality and Social Psychology, 85*, 132-141.

Share, M., & Stewart-Knox, B. (2012). Determinants of food choice in Irish adolescents. *Food Quality and Preference, 25*, 57-62.

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite, 25,* 267-284.

Zandstra, E., De Graaf, C., & Van Staveren, W. (2001). Influence of health and taste attitudes on consumption of low-and high-fat foods. *Food Quality and Preference, 12*, 75-82.

Chapter 4 - Drivers of food choice and consumption: An application of the Food Choice Map

Abstract

People choose foods for various reasons. The most common one is because they like it. However, there are more factors contributing to the process of making food decision. This study aimed to explore and validate the motivations underlying food choice using a new method that incorporated the Food Choice Map in a bottom-up approach. The study included one hundred one-on-one interviews, in which the respondents were asked to build a map of all the foods and beverages they typically eat in a usual week for morning, midday, snack and evening meals. Upon completion of the Food Choice Map, the respondents provided the reasons and the eating context for each of the choices on their map. The individual food and beverage items were then categorized into the corresponding food groups. The reasons were classified into fifteen motivation constructs, i.e. *liking*, *habits*, *need and hunger*, *convenience*, *health*, *pleasure*, *traditional eating*, *sociability*, *price*, *weight control*, *affect regulation*, *social norms*, *social image*, *choice limitation*, and *variety seeking*. Correspondence Analysis was performed on the count data of motivation constructs to identify the motivational drivers of consumption for both eating occasions (meals and snacks) and food groups. As a result, meals were found to be different from snacks both in food motivations and food patterns. *Pleasure* was the driving factor for snacks, but not as important for meals. Different food groups also were chosen with different motivations. Filling food groups were linked to *convenience*, *variety seeking*, *traditional eating*, and *price* while lighter food groups were associated with *need and hunger*, *health*, and *weight control*. The findings of the study could be used as inputs when dietary changes are desired,

whether those changes are related to new or revised products being promoted by industry or are dietary changes that result from government or social policy issues.

Introduction

There is a universal agreement that food choice is a complex process. This very basic activity in human life is not as simple as it might appear. People often are not aware of why they eat what they eat. When facing that question, people's most frequent responses would be "because I like it" or "because it tastes good". Sensory/hedonic grounds are the most fundamental reasons for food preferences and aversions (Rozin, 2007). However, this reason alone cannot explain a variety of food choices people make daily. It cannot explain why people choose to eat green leafy vegetables that they described "distasteful" over spicy crispy fried chicken which is "tasty". This kind of choice often relates to what is called "anticipated consequences" (Rozin, 2007). It often has to do with health, but can also involve a larger frame of references of consequences, such as convenience, hunger, cost, cultural traditions, or social relationship (Connors, Bisogni, Sobal, & Devine, 2001; Furst, Connors, Bisogni, Sobal, & Falk, 1996; Köster, 2009). Other factors such as ethics (Connors et al., 2001), variety (Trijp, 1995), safety (Wilcock, Pun, Khanona, & Aung, 2004), context (Bisogni et al., 2007; Blake, Bisogni, Sobal, Devine, & Jastran, 2007; Blake, Bisogni, Sobal, Jastran, & Devine, 2008; Jaeger, Marshall, & Dawson, 2009; Meiselman, Frewer, & Trijp, 2006) are also found to contribute into people's food decision. Sobal and his colleagues (Connors et al., 2001; Furst et al., 1996; Sobal, Bisogni, Devine, & Jastran, 2006) bring in the concept of 'personal food system' as 'a dynamic set of processes constructed to enact food choice.' Within this personal system, people manage different food-values to make decisions.

There are many different approaches to study food choice. One of the popular methods is using a survey questionnaire with measurement scales to quantify the influences of factors of interest such as biology, psychology, economics, social, or emotion on food choice. Until now studies of food choice have been primarily the application or development of the Food Choice Questionnaire (Steptoe, Pollard, & Wardle, 1995) which includes 9 standard motivation constructs to measure food choice (Carrillo, Varela, Salvador, & Fiszman, 2011; Pohjanheimo, Paasovaara, Luomala, & Sandell, 2010; Pula, Parks, & Ross, 2014; Share & Stewart-Knox, 2012). A recent developed survey questionnaire called The Eating Motivation Survey (Renner, Sproesser, Strohbach, & Schupp, 2012) aims to provide a more comprehensive measurements of motivations for food choice using 15 scales and 45 items. These works have been an important part of the domain of food choice. However, the approach using surveys is a self-report approach which often does not support data validation and reflects people's eating mind but not their eating experience, especially when a top-down process is employed. It's not uncommon to find food behavior studies that provide people with statements such as "Food I eat should be …." and offer responses as "agree" or "disagree" with certain degree. This makes people think about their eating overall but not engage in specific eating experience to explore what is the driving factor of their choice. Qualitative methods such as focus groups and interviews are another approach to explore what are behind people's food choice. The strength of this approach is at its ability to give insights into people's attitudes, opinions, concerns or belief in the topic of interest (Chambers & Smith, 1991). Factors influencing food choice are often explored by this approach (e.g. Bisogni, Connors, Devine, & Sobal, 2002; Connors et al., 2001; Neumark-Sztainer, Story, Perry, & Casey, 1999; Palojoki & Tuomi-Gröhn, 2001) but the effects of the exploring factors are usually not quantified.

With the aim of developing a tool that is comprehensive but not too burdensome for people to evaluate dietary behavior, Sevenhuysen and Gross (2003) developed the Food Choice Map (FCM) which was later validated by Shuaibi, Sevenhuysen, and House (2008). This technique is a qualitative interview procedure that records the frequency of food consumption and the reasons for food choices. In a FCM interview, respondents are asked to recall foods they eat often in a usual week, followed by questions about the meal or snack times, foods eaten less frequently at those meals, and a variety of aspects related to those foods and their frequencies of consumption, such as where purchased, when and with whom consumed, likely important for health, perception of cost, and other aspects of interest to the respondent. The respondents also help to create a visual record, or map, of food frequencies, by placing food symbols (generic picture of a food) on a board or a large sheet of paper. The FCM helps to identify reasons for changes in food choice. The FCM also links data on dietary behaviors with perceptions that respondents use to explain of those behaviors. With a large enough sample size, the FCM allows quantitative results to be generated, which was presented in this study.

In line with a series of studies on food motivations (see Chapter 2 and Chapter 3), this study aimed to validate the results of previous studies about driving factors of people food choice and consumption for different food groups and eating situations using the Food Choice Map with a bottom-up approach that first collected motivations data for specific food/beverage items in people's daily eating and then used that to find the motivation constructs of the larger food categories and eating situations.

Materials and Methods

Participants

One hundred respondents who were older than 18 years old have participated in this study. Participants were classified based on age (18-32, 33-44, 45-60, 61 and older), employment status (employed, unemployed, retired, and homemaker), sex (male, female), with all having living in the States at least 10 years or their whole life). Recruitment was conducted via Compusense at-hand software (Compusense Inc., Guelph, ON, Canada) using the consumer database of the Sensory Analysis Center at Kansas State University. Therefore, a majority of the respondents were from Manhattan KS. A total of 111 people were recruited but only 100 participated in the study. They were paid $25 for their time. Table 4.1 summarized the demographic information of the participants of this study.

Table 4.1 Demographic information of one hundred participants who were Kansas residents

Demographics	%
Sex	
Male	35
Female	65
Ethnicities	
White/Caucasian	87
Others (Black, Asian, Hispanic)	13
Age	
18-22	22
23-44	34
45-60	29
61-74	15
Employment	
Full time	61
Part time	27
Unemployed	9
Retired	3

Student	
Yes	38
No	62
Annual Income	
≤ $25,000	27
$25,001 - 49,999	21
$50,000 - 99,999	33
>$100,000	14
Prefer not answer	5
Live in the US	
10 years or more	4
All life	96

Interview procedure

The study included an in-depth one-on-one interview using The Food Choice Map technique, adapted from Sevenhuysen and Gross (2003). The interview content was reviewed and approved by the Internal Review Board of Kansas State University. In the interview, the respondents were asked to build a map of all the foods they typically eat in a usual week for morning, midday, snack and evening meals. The participants were provided with a stack of 700 pictures of foods and beverages from different categories such as breakfast cereals, dairy and egg products, poultry products, sausages and luncheon meats, fast foods, baked products, snacks, cereal grains and pasta, sweets, meats, soup, sauce and gravies, fruits and fruit juices, nuts and seed products, vegetables and vegetable products, beverages, legumes and legume products.

The participants were asked to pick out the food images that represent the typical foods and beverages that they often consumed in a week. Then, on a 84.1 x 118.4cm worksheet (Figure 4.1), they used temporary glue to stick the food images in a place to reflect the time of day of consumption, and the number of days in a usual week, ranging from 1 to 7, that they eat the food

for the same eating occasion (breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, late-night snack).

Upon completion of the food choice map of their weekly diet, the participants were asked to:

- Provide name for every eating occasion they have on the food choice map, such as breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, or late-night snack
- Indicate time of the day they consumed each of the meals
- Indicate the foods/beverages they were more likely to consume with friends or family members, and which foods/beverages they usually ate alone
- Provide information of where they often eat those meals
- Provide the reasons (motivations) for each food or beverage on their map by responding to the question "What reasons do you have for choosing ……(*food/beverage*)……..for your …….(*breakfast, lunch, dinner and so on*) …..?"

Ten technicians helped interview participants for this study. Because of their potential difference in style, the interviewers had to participate in one training session and two practice sessions, moderated by a scientist who had been trained at the RIVA Institute to moderate focus groups and conduct interviews. A detailed interviewer's guide also was developed and provided to the interviewers, which highlighted the core questions/information that they must extract from the interviewees. Probing questions for different scenarios were also provided in the guide, to prepare the interviewers for situations when the participant keep answering the same thing such as "because I like it" or is not very open in sharing information. On average, it took 45 to 60 minutes to complete an interview.

Figure 4.1 A Food Choice Map generated by one participant: columns 1 to 7 present the foods/beverages that were consumed once to seven times (everyday) in a usual week. Column 0 presents foods/beverages that were consumed less than once per week such as special occasions, seasonal, and so on. The rows present the time of the day at which the food item is consumed. In this example, cereal was consumed 4 times per week for breakfast at 6 am.

Data analysis

From the Food Choice Map, the food and beverage items were recorded and classified based on the eating occasions reported by the respondents (breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and late-night snack). The food items were then classified into different food groups, such as breakfast cereals, vegetables and vegetable products, or sausage and luncheon meats and so on, based on the National Nutrient Database for Standard Reference Release 27 of USDA (http://ndb.nal.usda.gov/ndb/foods). The food group data were then computed into proportions for each meal time and Correspondence Analysis was performed on these proportions to identify which food groups were often consumed in which eating occasions.

The reasons for choosing each food and beverage items from the notes of the interviewers and the transcription of the audio recordings were identified into fifteen motivation constructs, i.e. liking, habits, need and hunger, convenience, health, pleasure, traditional eating, sociability, price, weight control, affect regulation, social norms, social image, choice limitation, and variety seeking. This classification was made based on the motivation constructs in Renner et al. (2012). 'Liking' covered the sensory acceptability of food items. 'Habits' depicted choices due to familiarity and routines. 'Need and hunger' consisted of motives related to physiological needs. 'Convenience' captured motivations to acquire foods with minimal effort in preparation and consumption. Any reasons toward the healthfulness of a food were classified into 'health' construct. 'Pleasure' was used to represent reasons such as 'enjoyment', 'craving' and 'fun to eat'. 'Traditional eating' included choosing foods out of tradition. 'Sociability' took in reasons related to gathering with other people, 'social norms' comprised all choices to meat other's expectation, while 'social image' was representative for motives to make one look good in front of others. 'Price' contained all responses about financial reasons that toward the inexpensiveness

of the food item. ‘Weight control’ was for ‘low-calorie’ or ‘weight-watch’ reasons. Any reasons related to negative affective state was counted for ‘affect regulation’. Responses such as ‘because it’s the only choice’ or ‘it was what was served’ were put into ‘choice limitation’ construct, and ‘variety seeking’ was used for motivations toward alternating foods for different eating occasions.

The count data for these fifteen motivation constructs were then used to construct a factor map of motivation for both eating occasions (breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and late-night snack) and food groups by Correspondence Analysis (CA) in FactoMineR package (Le, Josse, & Husson, 2008). All analysis was performed in R 3.0.1 (R Development Core Team, 2007).

Results

Food patterns for different eating occasions

A total of one hundred Food Choice Maps (Figure 4.1) that presented the typical food and beverage items that the respondents consumed in a typical week, from not very frequent (less than 1 time per week or seasonal) to very frequent (7 times per week and many times per day) for six eating occasions. The interviews covered the reasons of consumption for 3427 items on those maps. All respondents used the name ‘breakfast” to indicate the eating that happened from 7 to 9 am, while ‘lunch’ was used for the eating around noon time. For the evening meals occurring from 5 to 8 pm, ‘dinner’ and ‘supper’ were the frequent names. For snacking events, the respondents named ‘mid-morning snack’ for the eating after breakfast and before lunch time; ‘mid-afternoon snack’ for snacking around 3-5pm, and ‘late-night snack’ or ‘evening snack’ or ‘night-out’ for any eating after 9 pm.

There were 691 food and beverages items reported for breakfast, both weekday and weekend. The main pattern of food consumption for weekday breakfast was dairy, cereals, fruits, and coffee. Egg and baked products were found to be the frequent breakfast foods for weekend. However, coffee remained to be the frequent beverage for breakfast. Breakfast was often consumed at home and alone or with family members. Lunch was dominated by foods that people could carry easily, including fast foods, baked products, fruits and vegetables among the total of 754 items reported for this meal. Dinner got the highest number of food and beverage items (1255), including different kinds of meats, poultry, fish and seafood, vegetables, fast foods, and grains (rice) & pasta. Alcohol was the other highly reported beverage for dinner beside water. No respondent drank coffee at dinner time. Savory snack foods, nuts and fruits were the most common foods consumed for day time snacking occasions, while sweet snacks and alcoholic beverages were the main foods for late-night snack. Water was reportedly consumed throughout the day and 7 days per week for about 43% of the respondents. Figure 4.2 presents the main food trends of these six daily eating occasions.

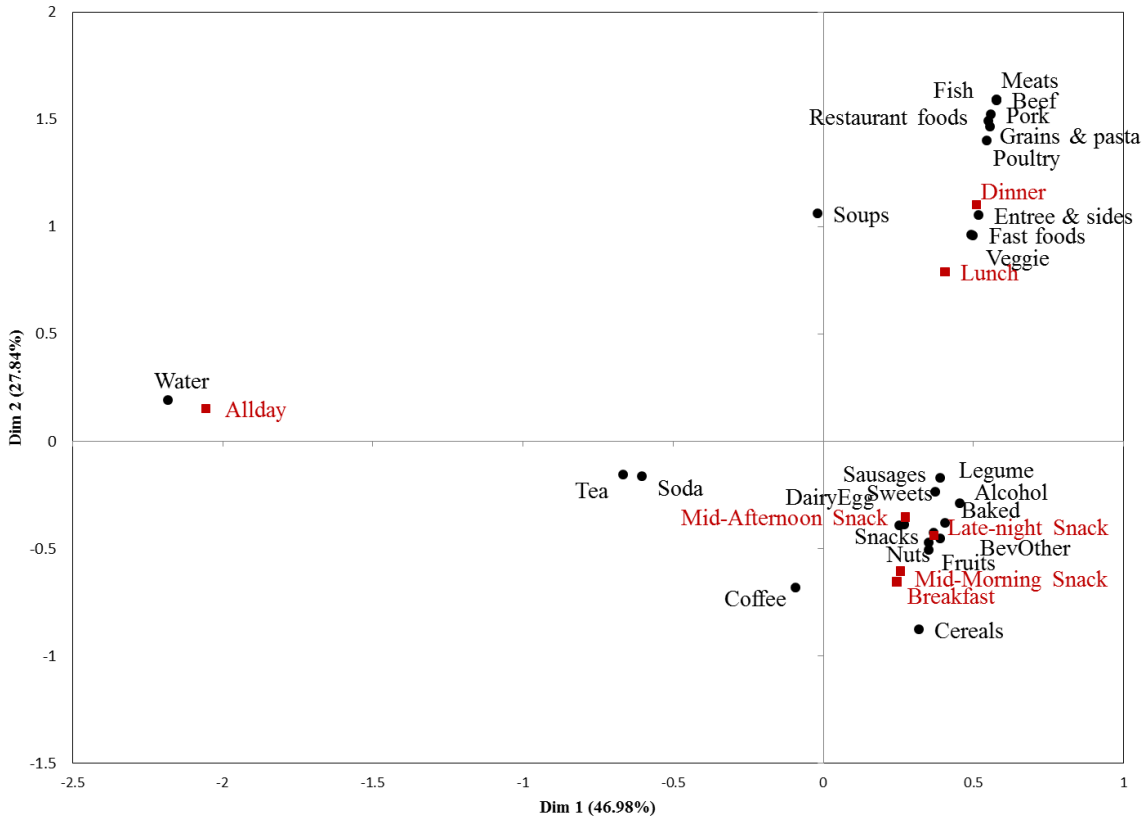


Figure 4.2 The CA factor map of the main food groups for different eating occasions

Motivation structures of meals and snack times

Besides the food and beverages reported for traditional meals and snack times mentioned above, there were 18 food items reported for 'brunch' which was used to name the combination of breakfast and lunch. This often happened at weekend and due to the small sample size, this meal was not included in the motivation structures. Motivation data for 'All day' were also removed from the analysis because these data contributed equally to all the other eating occasions. Therefore, the motivation structures presented in Figure 4.3 were for three main meals (breakfast, lunch, dinner) and three snack times (mid-morning, mid-afternoon, late-night).

Dimension 1 of the CA factor map presented the motivation constructs of snack times through the day, from morning to evening. For snacking, people's motivations changed from the very basic need (physiological factors) such as 'need and hunger', and the anticipated consequence of 'health' and 'weight control' for day time snacking to a more mental need such as 'sociability', 'pleasure', and 'affect' for snacking in the evening and late into the night. The same structure was observed for meal times (dimension 2), with breakfast was associated with 'need and hunger', 'health', and 'weight control' while food choice for dinner was motivated much more by psychological factors such as 'sociability', 'social image', and 'family tradition'. 'Liking' and 'convenience' were found to be the base motivations of every food choice for every eating occasion for this group of respondents.

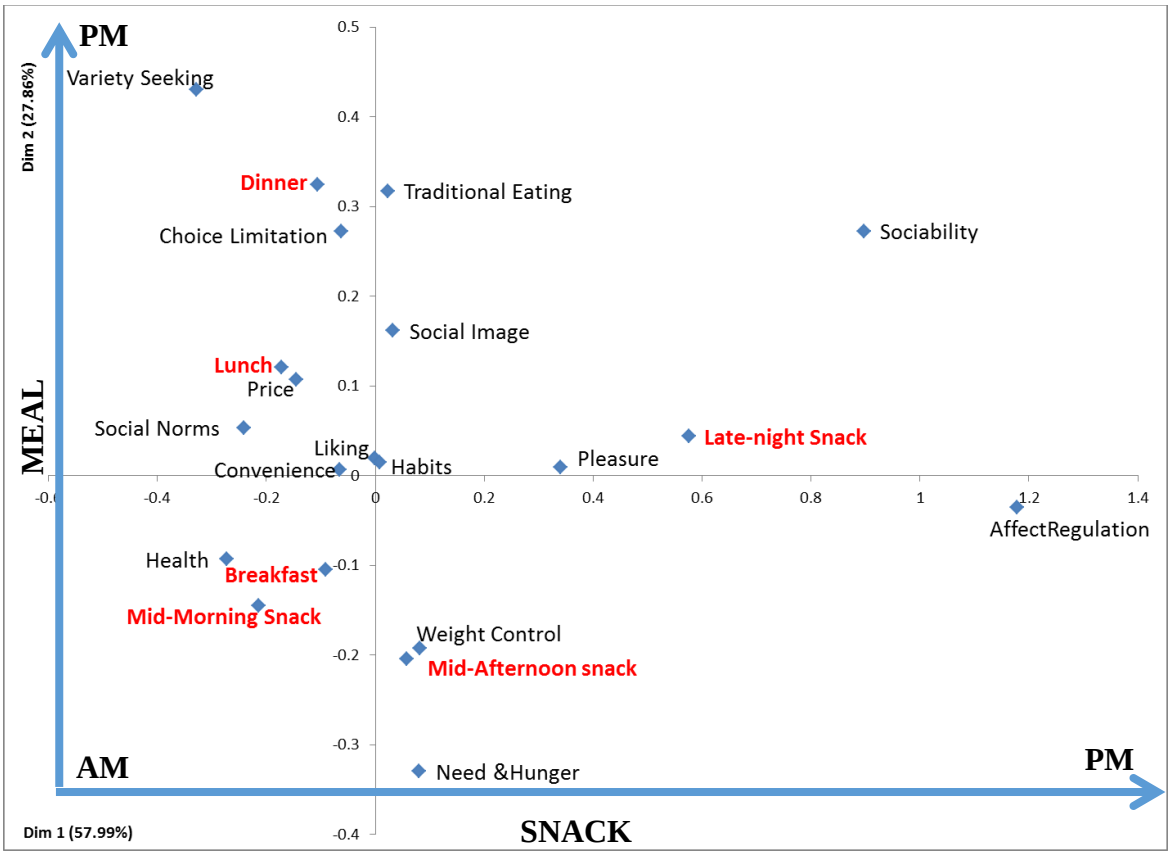


Figure 4.3 The CA factor map (explained 85.85% total variability) presenting the motivation structure of meals and snacking

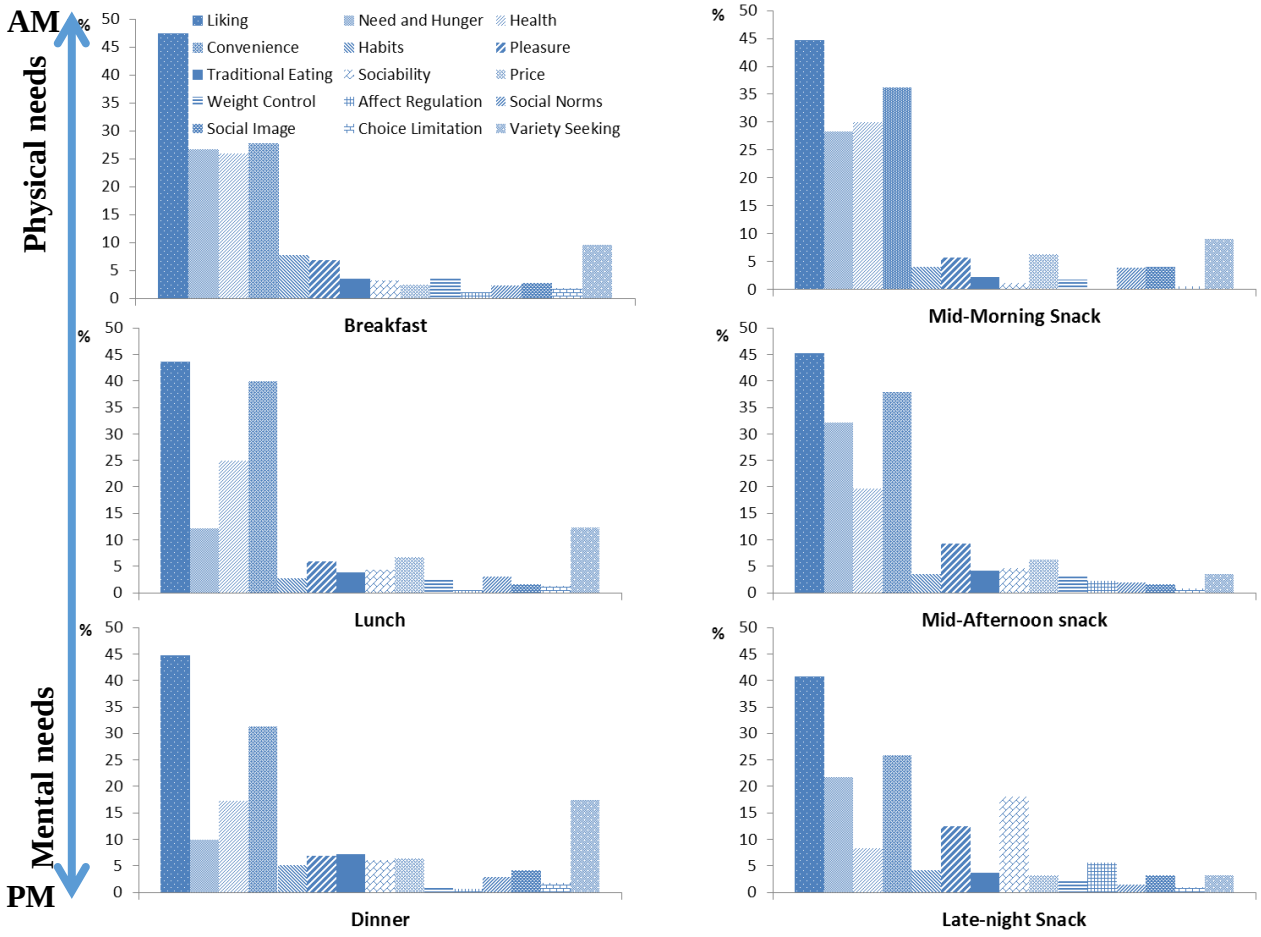


Figure 4.4 The motivation structures for meals and snack times.

The motivation constructs for meals and snack times form univariate point of view was presented in Figure 4.4. There was a strong structure in terms of changes of motivation for eating from day-time to night-time. Consistent with Figure 4.3, 'liking' and 'convenience' were the fundamental motivation of all choices of all eating. However, eating in day-time, regardless meal or snacking, was motivated more by physical needs, in which 'need and hunger' was the strongest, then concerns about body physical health. Meanwhile, eating at night-time had more to do with mental needs such as the ability to socialize with people, or to not hurt someone's

feelings by not eating certain things, or simply just to satisfy a need of pleasure to feel better. 'Lunch' was mostly motivated by the fundamental motivations and partly by 'health' concerns.

Motivations structures of food groups

Figure 4.5 showed the motivation structures of twenty four groups of foods and beverages that were naturally different from each other. Dimension 1 (explained 31.38% total variability) was the dimension of motivations ranging from physical needs (left) to mental needs (right). Meanwhile, dimension 2 (explained 26.66% total variability) was the dimension of the nature of food groups, ranging from foods that were more full-filling and served in large portion (bottom) to foods/beverages that were lighter and served in smaller portion (top).

'Liking' was again the fundamental driver of consumption of all foods and beverages, combining both dimensions. Foods containing meats (non-poultry) were chosen because of 'traditional eating' or 'social norms'. The motivational responses for these groups often were 'because it's my family tradition', 'I grew up in Kansas so beef is the huge thing', 'I grew up with it' (traditional eating), or 'because my wife eats it', 'because I was told to eat it', 'because I'm supposed to eat it', or 'avoid hurting the feeling of the person who made the food' (social norms). Foods belonging to the grains & pasta, soups & sauces, fish & shellfish, poultry, and vegetables groups were chosen more likely because of 'variety seeking', 'convenience', and 'price'. Frequent responses for these groups were 'because it's a change', 'because it's quick/easy to prepare/easy to eat', and 'because it's cheap/on sale', respectively. Nuts, seeds, legumes, breakfast cereals, dairy, eggs, tea and other beverages containing no caffeine or alcohol were reportedly chosen because of 'health' and 'need & hunger'. Water was chosen because "it's low in calories", in other words, because of 'weight control'. Choice of coffee was mainly related to 'habits'. Alcohol was for 'affect regulation' (sad, lonely, cheers me up) and

'sociability' while soda and sweets were found to associate with 'pleasure' as the main motivation.

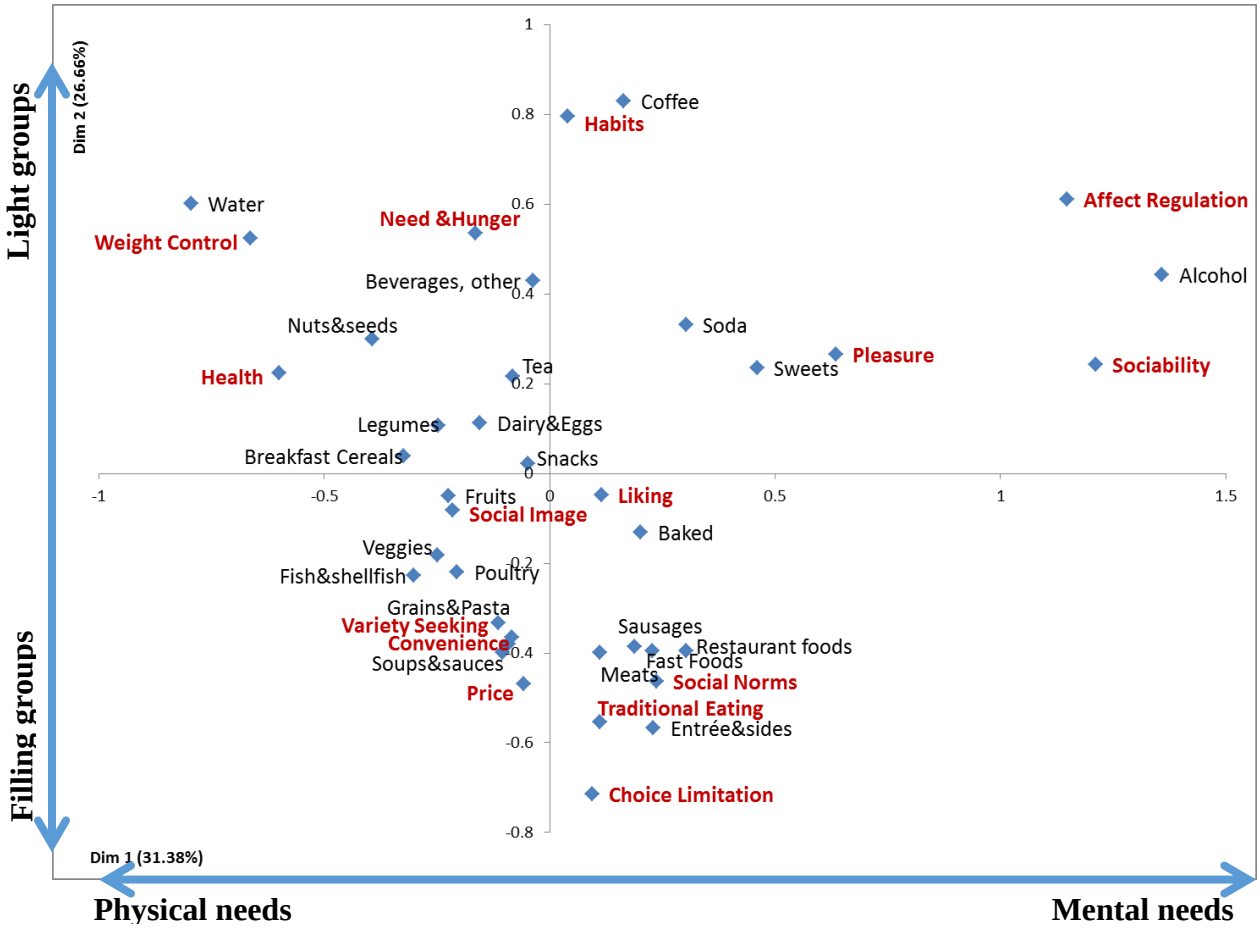


Figure 4.5 The CA factor map showing motivations associated with different food groups

Discussion

The study aimed to find the drivers of consumption of groups of foods and beverages that were different in nature as well as motivations driving food choices for different eating occasions throughout the day. 'Liking', as consistent with our previous findings (see chapter 2 and chapter 3) was the fundamental driver of choice/consumption of any food or beverage regardless of

meals or other eating occasions. People eat what they like and this has been the finding of a number of studies in literature (e.g. Carrillo et al., 2011; Drewnowski, 1997; Glanz, Basil, Maibach, Goldberg, & Snyder, 1998; Rozin, Bauer, & Catanese, 2003). 'Convenience' was the second important motivation behind food choice. The most frequent responses associated to this motivation construct were 'because it's fast', 'because it's easy to prepare/to eat', and 'because it's convenient'. Other response was 'because it's there'. Therefore, the 'convenience' construct here was the combination of two aspects: time consuming and availability (Rozin, 2006). The time consuming aspect was reported more for the staple food groups such as grain, meats, dairy, and soups and low-calorie foods such as fruits, nuts and seeds, while the availability aspect was related more for snack and energy dense foods such as fast foods and sweets. This suggested that to increase the consumption of a food, the best way would be making that food available, but of course this food has to meet a certain level of acceptability.

Taking into account the differences in food and beverage natures, other motivations have come to play in driving people's decision of eating one food instead of another. Thirteen additional motivation constructs, besides 'liking' and 'convenience', were documented, including 'need & hunger', 'habits', 'health', 'pleasure', 'traditional eating', 'sociability', 'price', 'weight control', 'affect regulation', 'social norms', 'social image', 'choice limitation', and 'variety seeking'. These motivation constructs were consistent with Renner et al. (2012), except that 'visual appeal' and 'natural concerns' were not found to be the reasons for choosing foods and beverages for any eating, but 'choice limitation' and 'variety seeking' were. 'Visual appeal' captures the motivation to choose food because of its appealing presentation and 'natural concerns' aims to assess if people's food choice was influenced by the preference for fair trade or organic products (Renner et al., 2012). This study found that these two motivations were not

the main drivers of consumption of foods and beverages. They might be the add-in value but not what could drive people's eating behavior.

Some main motivation constructs were observed for different food groups. People drank water to maintain weight, coffee as a habit, and alcoholic beverages to socialize or to cheer them up. It's not surprising that meats (especially beef) and fast foods were associated with 'traditional eating' given that the respondents were from the Mid-West of the United States. However, it's interesting to find that 'need and hunger' was the main reason for eating foods that did not come in large serving portion such as nuts, seeds, snack foods, dairy, or egg products. This was mainly because those foods were mostly consumed at morning or afternoon snack times to get people throughout the day at work.

Motivations for choosing foods for different eating occasions changed throughout the day, with more physical needs for day-time eating to more mental/psychological needs for night-time eating. This might be related to the circadian rhythm with the levels of arousal and alertness tends to rise during the morning and reach a peak near midday (Gibson, 2006). Choices for meals and snacking were found to go in two different paths which were driven by different main motivations. These motivation paths could be the result of how people conceptualize *meal* and *snack*. A m*eal* is a structured event with rules of combination and sequence while a *snack* does not possess that characteristic (Meiselman, 2008). Besides, depending on how people perceive an eating occasion as a meal or a snack, their food choice and food intake could be different (Wansink, Shimizu, & Payne, 2010). Regardless of the influences of 'liking' and 'convenience' which were the fundamental of all choices for all eating, choosing foods and beverages for snacking appeared to be the result of the interplay of 'health', 'pleasure', and 'sociability', depending on which time of the day the snack was chosen. On the other hand, more motivations

influenced the choices for meals such as ‘price’, ‘social norms’, ‘social image’, ‘traditional eating, and ‘variety eating’, but ‘pleasure’ was not one of those.

The bottom-up approach using the Food Choice Map has been shown to be a powerful method to investigate food choice. This method examined the issue at hand from two perspectives: qualitative and quantitative. By interviewing people about their reconstructed weekly diet map, the contexts of eating and the reasons for food choice was explored and validated, meanwhile with a sample size of one hundred, the technique provided a large enough quantitative data for statistical conclusions to be made. Furthermore, the technique allowed conclusions to be made at two levels: individual choices and group choices. At one hand, the study has documented the reasons people had for eating more than three thousand food and beverage items that could be made into a database for references. On the other hand, by classifying the individual choices into their corresponding food groups, motivations for eating those food groups were generated. The method also allowed exploring the reasons for choosing foods for different meals and snack events that were identified by the respondents themselves.

An added benefit of the approach was at the awareness impact it has on the participants. After the food map was completed, it’s not unusual to find the respondents were caught by surprise about how much of foods and how many varieties of foods they consumed in their weekly diet. They could easily visualize their eating patterns and have a perception about how ‘healthy’ or ‘not so healthy’ oriented their eating might be. The findings of the study showed that people do have certain knowledge of foods and beverages that are healthy or not so healthy. Therefore, the food map could be used as a visual record to direct people to a more healthy diet at their choice without telling them what they should or should not eat. It might be helpful for people who are having health problems such as overweight, obesity, or diabetes.

Even though the findings of this study were valid for only the American Caucasians living in the Mid-West, the method used in this study could be employed for any population, any location and any culture. Therefore, cultural and ethnic aspects as well as residence locations would be the focus of further studies using this method to validate previous findings of drivers of food choice and food consumption across the globe.

Conclusions

This study introduced a new method that incorporated the Food Choice Map and a bottom-up approach to investigate the motivations underlying food choice. The method was proved to be a powerful technique to explore and validate the motivation constructs qualitatively and quantitatively. *Meal* was found to be different from *snack* both in food motivations and food patterns. Different food groups were chosen with different motivations too. The findings of the study provided evidence to support the Expectancy-Value theory that different behavioral beliefs underpin attitudes to specific food groups (Towler & Shepherd, 1992). These findings validated previous discovers about food motivations and could be used as inputs when dietary changes are desired, whether those changes are related to new or revised products being promoted by industry or are dietary changes that result from government or social policy issues.

Acknowledgements

This research project was supported by the Sensory Analysis Center at Kansas State University.

References

Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., & Devine, C. M. (2007). Dimensions of everyday eating and drinking episodes. *Appetite, 48*, 218-231.

Bisogni, C. A., Connors, M., Devine, C. M., & Sobal, J. (2002). Who we are and how we eat: A qualitative study of identities in food choice. *Journal of Nutrition Education and Behavior, 34*, 128-139.

Blake, C. E., Bisogni, C. A., Sobal, J., Jastran, M., & Devine, C. M. (2008). How adults construct evening meals. Scripts for food choice. *Appetite, 51*, 654-662.

Blake, C. E., Bisogni, C. A., Sobal, J., Devine, C. M., & Jastran, M. (2007). Classifying foods in contexts: How adults categorize foods for different eating settings. *Appetite, 49*, 500-510.

Carrillo, E., Varela, P., Salvador, A., & Fiszman, S. (2011). Main factors underlying consumers' food choice: A first step for the understanding of attitudes toward "healthy eating". *Journal of Sensory Studies, 26*, 85-95.

Chambers, E., & Smith, E. (1991). The uses of qualitative research in product research and development. In H.T. Lawless & B.P. Klein (Eds.), *Sensory Science Theory and Applications in Foods* (pp. 395-412). New York: Marcel Dekker.

Connors, M., Bisogni, C. A., Sobal, J., & Devine, C. M. (2001). Managing values in personal food systems. *Appetite, 36*, 189-200.

Drewnowski, A. (1997). Taste preferences and food intake. *Annual Review of Nutrition, 17*, 237-253.

Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: A conceptual model of the process. *Appetite, 26*, 247-266.

Gibson, E. L. (2006). Emotional influences on food choice: Sensory, physiological and psychological pathways. *Physiology & Behavior, 89*, 53-61.

Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. (1998). Why Americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association, 98*, 1118-1126.

Jaeger, S. R., Marshall, D. W., & Dawson, J. (2009). A quantitative characterisation of meals and their contexts in a sample of 25 to 49-year-old Spanish people. *Appetite, 52*, 318-327.

Köster, E. P. (2009). Diversity in the determinants of food choice: A psychological perspective. *Food Quality and Preference, 20*, 70-82.

Le, S., Josse, J., & Husson, F. (2008). FactoMineR: An R package for multivariate analysis. *Journal of Statistical Software, 25*, 1-18.

Meiselman, H. (2006). The impact of context and environment on consumer food choice. In L. Frewer & H. van Trijp (Eds), *Understanding Consumers of Food Products*, (pp. 67-92). Boca Raton, FL: Woodhead Publishing Ltd and CRC Press LLC.

Meiselman, H. L. (2008). Dimensions of the meal. *Journal of Foodservice, 19*(1), 13-21.

Neumark-Sztainer, D., Story, M., Perry, C., & Casey, M. A. (1999). Factors influencing food choices of adolescents: Findings from focus-group discussions with adolescents. *Journal of the American Dietetic Association, 99*, 929-937.

Palojoki, P., & Tuomi-Gröhn, T. (2001). The complexity of food choices in an everyday context. *International Journal of Consumer Studies, 25*, 15-23.

Pohjanheimo, T., Paasovaara, R., Luomala, H., & Sandell, M. (2010). Food choice motives and bread liking of consumers embracing hedonistic and traditional values. *Appetite, 54*, 170-180.

Pula, K., Parks, C. D., & Ross, C. F. (2014). Regulatory focus and food choice motives. prevention orientation associated with mood, convenience, and familiarity. *Appetite, 78*, 15-22.

R Development Core Team. (2007). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing.

Renner, B., Sproesser, G., Strohbach, S., & Schupp, H. T. (2012). Why we eat what we eat. The eating motivation survey (TEMS). *Appetite, 59*, 117-128.

Rozin, P. (2007). Food choice: An introduction. In L. Frewer, & H. van Trijp (Eds.), *Understanding consumers of food choice* (pp. 3-29). Boca Raton, FL: Woodhead Publishing Ltd and CRC Press LLC.

Rozin, P. (2006). The integration of biological, social, cultural and psychological influences on food choice. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 19-40). Wallingford, UK: CAB International.

Rozin, P., Bauer, R., & Catanese, D. (2003). Food and life, pleasure and worry, among American college students: Gender differences and regional similarities. *Journal of Personality and Social Psychology*, *85*, 132-141.

Sevenhuysen, G. P., & Gross, U. (2003). Documenting the reasons people have for choosing their food. *Asia Pacific Journal of Clinical Nutrition, 12*, 30-37.

Share, M., & Stewart-Knox, B. (2012). Determinants of food choice in Irish adolescents. *Food Quality and Preference, 25*, 57-62.

Shuaibi, A. M., Sevenhuysen, G. P., & House, J. D. (2008). Validation of a food choice map with a 3-day food record and serum values to assess folate and vitamin B-12 intake in college-aged women. *Journal of the American Dietetic Association, 108*, 2041-2050.

Sobal, J., Bisogni, C. A., Devine, C. M., & Jastran, M. (2006). A conceptual model of the food choice process over the life course. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 1-18). Wallingford, UK: CAB International.

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite, 25*, 267-284.

Towler, G., & Shepherd, R. (1992). Application of Fishbein and Ajzen's expectancy-value model to understanding fat intake. *Appetite, 18*, 15-27.

Trijp, v. J. (1995). Variety-seeking in product choice behavior. Theory with applications in the food domain (Doctoral dissertation). Retrieved from http://edepot.wur.nl/136824.

Wansink, B., Shimizu, M., & Payne, C. R. (2010). Is this a meal or snack? Environmental cues or timing that drive food intake. Retrieved from http://foodpsychology.cornell.edu/sites/default/files/MealOrSnack-2010.pdf.

Wilcock, A., Pun, M., Khanona, J., & Aung, M. (2004). Consumer attitudes, knowledge and behaviour: A review of food safety issues. *Trends in Food Science & Technology, 15*, 56-66.

Chapter 5 - Motivations for meals and snacks: Three approaches revealed similar constructs

Abstract

Meals and snacks are conceptualized differently. Meals are structured while snacking often is not. Food choices for meals, thus, are expectedly different from food choices for snacks. By using three approaches incorporating two psychological perspectives: top-down and bottom-up, this research project aimed to investigate the motivation factors influencing choices of foods and beverages for different eating occasions at various time of the day. The first approach was using an online Eating Motivation Survey (TEMS) to examine motivations for individual food items within specific contexts of eating. The second approach was employing the Food Choice Map technique to also explore motivation for individual food choices for all eating within a typical week. The last approach was using TEMS to investigate food choice directly for eating occasions, without information about what were eaten specifically. Findings from all three approaches supported that food patterns for meal were different from what for snack. Choosing foods and beverages for meals were the result of the interplay of more motivation factors than for snack. Food decision was significantly influenced by the time of the day at which the eating occurred. Day-time eating was driven more by function-oriented factors and night-time eating was more because of psychological or emotion-oriented needs. Findings from this project advanced and reinforced the knowledge in the food choice domain and encouraged investigating food choice from different perspectives.

Introduction

In the domain of food choice, there are a number of studies using questionnaires as the main technique to approach factors influencing people's choices of foods and beverages for daily

diet. Among those, the Food Choice Questionnaire (Steptoe, Pollard, & Wardle, 1995), the Motivations to Eat Scale (Jackson, Cooper, Mintz, & Albino, 2003), the Affective and Cognitive Origins of Likings and Dislikes (Letarte, Dube, & Troche, 1997), the Ethical Food Choice Motives questionnaire (Lindeman & Väänänen, 2000), the Health and Taste Attitudes Questionnaire (Roininen, Lähteenmäki, & Tuorila, 1999) to name a few. The development of these questionnaires involve several steps that incorporate qualitative techniques at early stage to identify the influencing factors in food choice and then the confirmation stages to validate the questionnaire. Such processes have been used in the development of the Eating Motivation Survey (TEMS) (Renner, Sproesser, Strohbach, & Schupp, 2012). Because TEMS has taken into account the strengths of many existing questionnaires and scales measuring food choice, it can be seen as a very comprehensive /thorough questionnaire to evaluate many aspects of food choice motivation. Therefore, this questionnaire was chosen to be the main measures of food motivations in this study. However, this questionnaire was used in three different ways.

The first approach was an online survey that indirectly investigated people's motivations for choosing foods for different eating occasions via the motivations they have for choosing specific food and beverage items for a specific eating event that people reported. This was called a "bottom-up" approach which borrowed the term from cognitive psychology to convey the method (Sabatier, 1986). The approach was in the name, which started with collecting motivations for individual choices of food and beverage items and then working its way up to summarize motivations for the eating event related to those food and beverage items. Internet-based approach was chosen because of its ability to access to individuals in distant locations, automate the process of data collection (Wright, 2005), save time and reduce cost (Evans & Mathur, 2005; Lefever, Dal, & Matthiasdottir, 2007). Online survey was found to provide more

honest responses than printed questionnaire (Huang, 2006). Therefore, despite there are some concerns about using online surveys such as low response rate, unclear answering instructions or the representativeness of the sample (Evans & Mathur, 2005; Wright, 2005), this study used internet-based surveys as one of the approach to reach out to a large group of people at a timely fashion.

The second approach was an adaptation of the Food Choice Map (Sevenhuysen & Gross, 2003). This method initially is a qualitative interview procedure that records the frequency of food consumption and reasons for food choices. In a FCM interview, the respondents create a map that presents foods they ate often in a usual week and provide detailed information about the contexts of eating those foods. This technique was validated by comparing with 24-h recall interviews and later was validated again by Shuaibi, Sevenhuysen and House (2008). This study applied this technique on a large sample size with the aim of collecting quantitative data with supporting qualitative information. Based on the food map people create, in-depth interviews with probing questions for eating occasions and reasons behind each food choice on the map were conducted. This technique collected motivations for individual choice and used those to generate the motivation constructs for corresponding eating occasions. In other words, this second approach was also a "bottom-up" process. Data transcription from the interviews was based on the motivation factors of TEMS.

The third approach was to use the same online TEMS questionnaire but instead of targeting individual food choices, it directly asked people to provide motivations for eating occasions. "Top-down", also a term borrowed from cognitive psychology (Kinchla & Wolfe, 1979), was used to name this approach to depict the idea that people were asked to directly respond to the stem statement such as "Consider all the foods and drinks I eat for breakfast (mid-

morning snack/lunch/mid-afternoon snack/dinner/late-night snack), I eat those foods because …". This procedure made people first think about their breakfast eating as a whole and then read through all TEMS scales to find the motivations that they consider "appropriate" for their answers. This approach also employed an internet-based method due to its advantage of automating the data collection process and eliminating mistake of the data entry process. The results from this approach were used to justify the results from the other two approaches using 'bottom-up' procedures.

In short, this study utilized three approaches that incorporated both qualitative and quantitative methodologies to explore and validate the motives underlying people's food choices for different eating occasions. Findings from this study were expected to stabilize the knowledge about motivation constructs of food choice and assist the efforts to change people's eating toward a healthier orientation.

Materials and methods

Online survey questionnaires targeting motivations for individual food and beverage choices (Survey applied to individual choices)

The survey questionnaire took in the brief version of TEMS (Renner et al., 2012) which included fifteen motivational factors and incorporated two additional factors into the questionnaire, i.e. Choice Limitation and Variety Seeking. Each of the motivational factors was measured by three scales with the exception of Convenience (four scales), Choice Limitation (two scales) and Variety Seeking (two scales). Detailed of the measurement scales for these seventeen motivational factors were reported in chapter three. The core of the questionnaire was to ask the respondents to report which was the latest meal/eating they had by choosing from the lists of six eating occasions including breakfast, mid-morning snack, lunch, mid-afternoon snack,

dinner, and late-night snack. If their eating was not one of these six options, then they could choose option 'other' and specify the name of that eating. After that, they were asked to specify how many food and beverage items they consumed for that eating occasion, and what those items were. The respondents were then provided with one TEMS per item to indicate the reasons why they chose to eat that food or beverage item. If one reported eating three items for breakfast, which were 'a fried egg', 'a cup of coffee' and 'an apple', then s/he filled out three modified TEMS for those three items to report all the reasons underlying those choices. The minimal number of item was one and maximal was seven. If a respondent ate more than seven items then s/he were instructed to report for only seven representative items.

There were 198 respondents completed this survey questionnaire. They were people living in the Mid-West of the United States (Manhattan, Kansas), 18 years or older. A majority of this sample were faculty, staff and students of Kansas State University, with fifty six percent of the sample was full-time employed.

The Food Choice Map targeting motivations for individual choices (FCM)

One hundred people were recruited via the consumer database of the Sensory Analysis Center at Kansas State University for this study. The respondents were older than 18 years old, and mostly were White/Caucasian American. The respondents were invited to come to the testing facility to participate in a one-on-one interview about their diet in a typical week. The respondent was first asked to sort through a pile of 700 pictures depicting different food and beverage items to pick out those they normally consumed in a typical weekly diet. They were then instructed to use those pictures to build a map of their weekly diet, including the consumption frequencies (how many times per week) and the eating time throughout the day. After completing the map, they were asked to provide the reasons for consuming each food and

beverage item on their map, together with information about the eating context, such as which meal/eating occasion the food was consumed, with whom and where the food was eaten. Figure 5.1 presented three food maps from three participants representing three different dietary patterns: routine (5.1a), moderate alternative (5.1b) and variety seeking (5.1c).

Figure 5.1 The diet maps created using the Food Choice Map technique by three participants with three different eating patterns

Online survey questionnaire directly targeting motivations for different eating occasions (Survey applied to eating occasions)

This survey questionnaire was conducted after the Food Choice Map, using the same respondents from the FCM. The participants were provided with an iPad and a link to access to an online survey which contained six TEMS questionnaires (modified brief version similar with what was used in the first approach) for six eating occasions: breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and late-night snack based on their actual consumption. The respondents could skip a questionnaire for the eating that they did not consume on a daily basis. For instance, if they did not eat late-night snack daily then they skipped TEMS for that eating.

The respondents were instructed to take into account all food and beverage items they consumed for that specific eating and use TEMS to indicate the reasons for consuming those foods for that eating occasion. Even though this was an online survey, the respondents completed the questionnaire in the presence of a technician, in case they needed any clarification.

Data analysis

For the *survey applied to individual choices*, each food and beverage item was recorded and classified based on the eating occasions reported by the respondents. Motivations from each food item were counted for the eating occasion at which it was consumed. For the *FCM*, the reasons for eating were documented using TEMS as the frame of reference to classify the reported reasons into motivation factor for each of six eating occasions of interest. For instance, reasons such as "because it was quick", "because it's easy to eat/to carry" were classified as *convenience*. For the *survey applied to eating occasions*, motivation factors from TEMS were counted directly for each eating occasion. Due to the difference in the numbers of responses for each eating occasion, the count data collected from all three approaches were transformed into proportions to make reasonable comparison of the results. Correspondence Analysis (CA) was used to link the eating occasions to the motivation factors using data from the *survey applied to eating occasions* as active quantitative variables and data from the *survey applied to individual choices* and the *FCM* as supplementary variables to explore the motivations underlying eating occasions as well as to examine whether there was a consistent results from three methods. The analyses were performed in R 3.0.1 using FactoMineR package (Le, Josse, & Husson, 2008). In addition, proportion tests using Pearson's chi-squared test statistics were performed on the proportion data of all seventeen motivation factors to investigate the difference among the six eating occasions in terms of motivation constructs.

Results

Motivations for different eating occasions from three different approaches

Both survey questionnaires found all seventeen motivation factors have certain impacts on the food decisions of people. These factors were: *liking*, *convenience*, *habits*, *need and hunger*, *health*, *weight control*, *natural concerns*, *price*, *visual appeal*, *choice limitation*, *pleasure*, *affect regulation*, *sociability*, *social norms*, *social image*, *traditional eating*, and *variety seeking*. However, the interview procedure (FCM) resulted in only fifteen motivation factors. *Natural concerns* and *visual appeal* were not found to be the reasons for people's food choice from the interview process. Figure 5.2 presented the CA factor map showing the motivation structures (in **bold**) for choosing foods to consume in different eating time throughout the day using the direct TEMS questionnaire. Dimension one (explained 48.25% total variability) tends to be the driving motives for snacking from day-time to night-time while dimension two (explained 39.84% total variability) tends to be the motives for meals, also from day-time to night-time. This revealed that snacking and meals were different in motivation constructs, and these motivations were influenced by the time of the day at which the eating occurred.

Liking was the most fundamental driving factor and *Convenience* was the second one for food choices of all eating, regardless of the time of day. On the first dimension, a morning snack was associated with functional-oriented motives such as *weight control*, *need and hunger*, *health* and *natural concerns*, when moving to the afternoon time, snacking was motivated by *need and hunger*, and toward the evening time, snacking was more for *pleasure*, *visual appeal* and *affect regulation*. On the second dimension, motivations for meals were also affected by whether the meal was eaten in the morning, noon or evening. Choices for breakfast were mainly driven by need and hunger, health and natural concerns, while lunch was more related to price and habits.

Breakfast and lunch shared similar motivational patterns of 'functional-oriented" motives while dinner was motivated by additional factors that satisfied psychological needs such as *variety seeking*, *traditional eating*, and *sociability*.

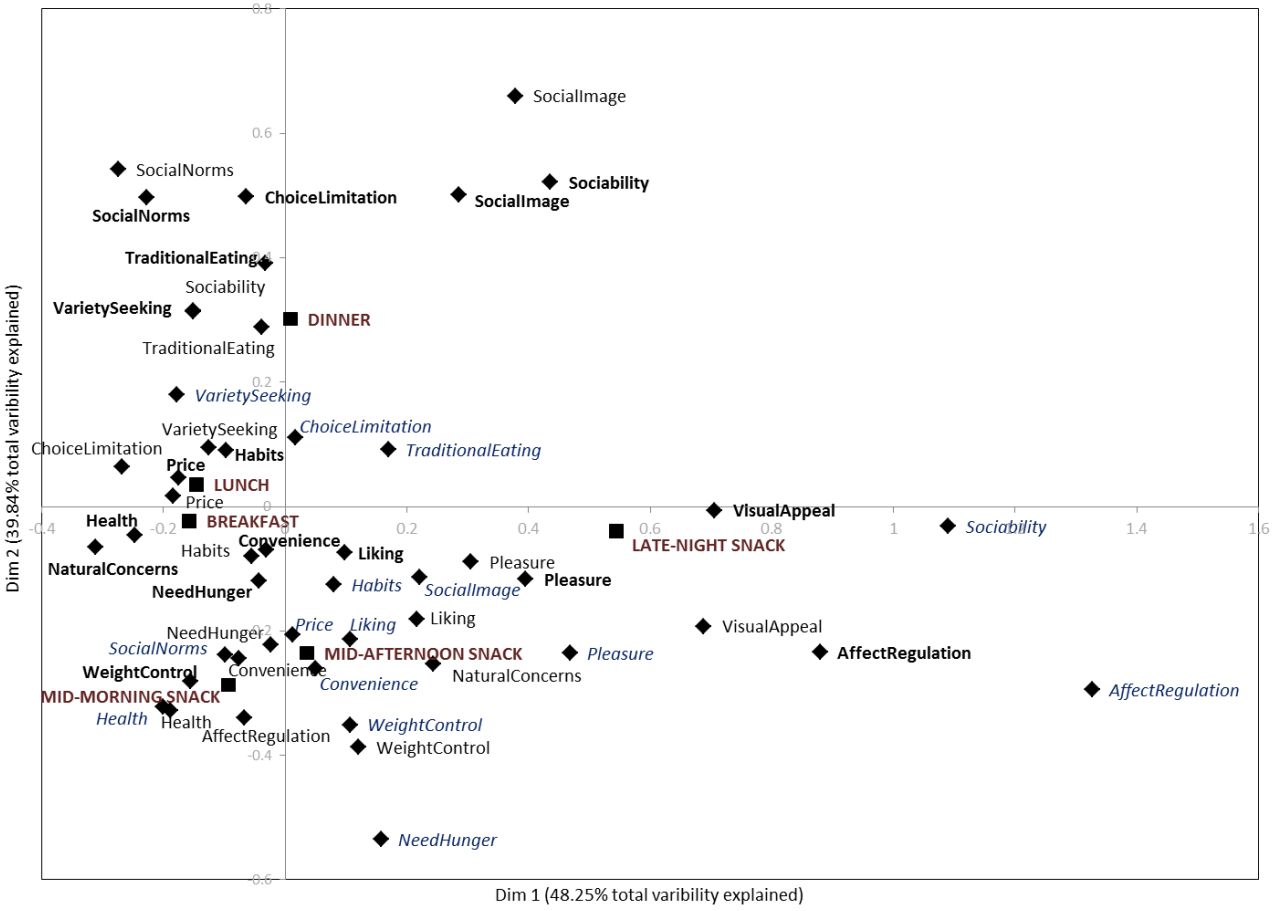


Figure 5.2 The CA map presenting the motivation constructs for meals and snack times using the TEMS data from the survey applied to eating occasions as active variables and the data from the TEMS applied to individual choices and the Food Choice Map as supplementary variables. Bold– Direct TEMS for eating occasions; *Italic*– Food Choice Map, individual food items; Normal– indirect TEMS for individual food items

Supplementary motivation constructs from the survey *applied to individual choices* (normal font) and *FCM* (*italic*) were also presented in Figure 5.2. The detailed results from these two studies were reported in other publications from the same authors. However, the important

outcome was that results from these two bottom-up methods showed a very similar motivation pattern with the results from the survey using direct questionnaire for eating occasions (top-down method). This could be observed from Figure 5.2 where the results from the survey *applied to individual choices* were presented in normal font and FCM in italic font. The survey *applied to individual choices* found that day-time snacking (mid-morning and mid-afternoon) were motivated by need and hunger, health, convenience, and weight control, while the late-night snack was more for pleasure and visual appeal. Breakfast and lunch had similar motivations which were habits and price while dinner was linked to variety seeking, traditional eating, and sociability. The same results were found from the FCM method, but late-night snack was found to be also motivated by sociability and affect regulation. Results from three methods were very consistent to each other.

Table 5.1 presents the percentage of responses for each of the motivation factors in the functional-oriented groups from the *survey direct*, which were used to build the factor map in Figure 5.2. Surprisingly, *Liking* appeared to be linked more to meals than snack times. *Convenience* was more important for breakfast and lunch than for other eating. Choosing foods as results of habits and health concerns was found to be more for meals than snacking. *Need and hunger* was another core of food choices for all eating except late-night snack. *Choice limitation* was reported much for dinner but not for other eating. People were more concerned about *price* (less expensive) when it came to foods for meals but not for snacks.

Table 5.1'Fundamental of function-oriented' motivation responses (%) for choosing foods for different eating occasions from the survey *direct*

Eating	N	Liking	Convenience	Habits	Need and Hunger	Health	Weight Control	Natural Concerns	Price	Choice Limitation
Breakfast	92	68.12	49.46	42.75	58.70	53.26	31.52	7.97	25.72	6.52
Mid-morning Snack	63	48.68	26.98	14.29	47.62	32.80	25.93	2.65	13.76	3.17
Lunch	99	61.28	45.45	36.36	60.27	44.78	27.61	4.71	31.65	9.09
Mid-afternoon Snack	75	46.67	26.00	17.78	50.67	27.56	20.89	4.44	14.67	3.33
Dinner	99	71.04	38.38	38.38	62.29	46.46	17.17	5.05	27.61	20.20
Late-night Snack	63	53.97	26.19	16.40	31.75	9.52	11.11	0.53	8.47	3.17
p-value		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.006159	<0.0001	<0.0001

Table 5.2 'Psychological or emotion-oriented' motivation responses (%) for food choices for different eating occasions from the survey *direct*

Eating	N	Pleasure	Affect Regulation	Sociability	Social Norms	Social Image	Traditional Eating	Variety Seeking	Visual Appeal
Breakfast	92	28.62	0.36	5.80	4.71	1.45	17.39	24.46	4.35
Mid-morning Snack	63	22.22	1.06	0.53	1.06	1.06	1.59	10.32	2.12
Lunch	99	23.91	0.34	11.45	3.70	2.02	8.08	30.30	3.03
Mid-afternoon Snack	75	29.78	2.67	2.67	1.33	0.89	2.22	10.67	4.00
Dinner	99	35.69	2.02	23.23	8.42	6.73	18.18	43.43	6.40
Late-night Snack	63	44.97	3.70	14.29	0.53	2.65	6.35	7.94	10.58
p-value		<0.0001	0.01814	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.001128

The responses (%) for the groups of 'psychological- and emotional-oriented' motivations are presented in Table 5.2. *Pleasure* was found to be more essential for choices for dinner and late-night snack. This showed that *pleasure* was the driving factor for food choices for evening eating. *Affect regulation* was also linked to the night-time eating but from this data, it's not very important due to the fact that it had very few responses. *Sociability*, *social norms*, and *social image* were found to be the reasons for dinner's food choices. *Traditional eating* and *variety seeking* were another two key drivers for dinner. Late-night snack was mainly the eating time

when people cared much about *visual appeal* of the foods. *Sociability* was also another reason for people to get to snack at late night time.

Different styles in food consumption and eating behavior

Results from the survey *applied to individual choices* and the Food Choice Map studies showed that people consumed more breakfast cereals, dairy, egg, and coffee for breakfast. Snack times were dominated by savory snack foods, fruit, nuts, seeds and sweets. Dinner and late-night snack had the presence of alcoholic beverages, which were not in any day-time eating. Lunch had more 'convenient' foods, which include fast foods, vegetables, and pre-made dishes. Dinner had the most variety of food groups, such as grains and pasta, meat and poultry, fish and seafood, vegetables, fast foods and restaurant foods.

The Food Choice Map studies also revealed at least three different styles of a weekly dietary style of the respondents of this project. Of all one hundred participants, 42% had a very fixed dietary pattern across the week. These people only consumed a few food items for every meal and the same for every day. This was named the 'routine' style (Figure 5.1a). The second style was those who ate a moderate amount of items and tried to alternate their foods everyday but not so much. This group occupied 42% of the respondents and was called the 'moderate alternative' style (Figure 5.1b). The third style was those who changed food every day and had many choices for every meal. The majority of their weekly dietary maps were food items with the consumption frequencies of at most 3 times a week. This was the 'variety seeking' style, and 16% of the respondents had this style for their dietary behavior (Figure 5.1c). The food maps from the respondents also provided information whether a respondent was 'healthy-eating oriented' or 'pleasure-eating oriented'. 'Healthy-eating' was for the dietary pattern of consuming a majority of fruits, vegetables, nuts, seeds, dairy products and water (Figure 5.1b). 'Pleasure-

eating' was used to classify the eating with more baked products, sweets, carbonated drinks, fast foods, and meats (Figure 5.1c). Forty-eight percent of the participants of the FCM study were found to be healthy-oriented, with fruits and vegetable occupied more than two-third of their food items consumed per week, but the other more than fifty percent were 'pleasure-oriented' eating type.

Discussion

Food choice is a complex decision that people have to make on a daily basis. Understanding why people eat certain foods is very important for changing dietary behavior when that change is needed, especially when malnutrition remains an issue around the world. This research project, by using three different approaches, aimed to explore and confirm the motivations influencing each of people's food choices for various eating occasions that occurred at different time of the day. The project also introduced the so-called 'bottom-up' approach to investigate food choice. The contribution of this project to the field was at its validation value of the factors motivating people's food decisions. Meals were different from snacks in terms of the importance of each motivation factor and types of foods consumed. This was consistent with Bellisle (2014). Each eating occasion could be considered as an 'episode' (Bisogni et al., 2007) with its own features that incorporated specific food and drink types, time at the day, recurrence during the week, and corresponding motivation constructs. Bellisle et al. (2003) found similar food patterns and motivations for meals and snacks from French consumers, that the French reported food groups containing high energy content and weight such as meats, fish, dairy products for meals, while snacks were dominated by sweets, cereal bars, biscuits, and sodas. The similarity between the food patterns of two different populations in two different countries implied a universal characteristic of the structures of meal and snack. This project confirmed that

these structures were influenced by the interplay of different motivations associated with different good groups and whether the eating was meal or snack.

Another significant finding from this project was that motivation for food choice changed throughout the day, with day-time eating was motivated by functional-oriented factors such as need and hunger, health, weight control, habit and price, while night-time eating was to satisfy 'psychological- or emotional-needs' such as to socialize with people or to please self and others. Liking was found to be the core of every choice, regardless of eating time and whichever approach used to investigate food choice. This result was consistent with Peters, Rappoport, Huff-Corzine, Nelsen, and Downey (1995) and Rappoport, Downey, and Huff-Corzine (2001).

From the findings of all three approaches, it is possible to conclude that there appeared to be validity in the seventeen motivation constructs used in this project in exploring motivation for food choice in various eating occasions. The project also confirmed that *variety seeking* should be included in studies of food choice under the context of meals because this motive was one of the main drivers for dinner. The 'bottom-up' approaches provided very consistent results with the 'top-down' approach to give insights into understanding eating at different time of the day. Furthermore, this approach outplayed the 'top-down' approach in the way that it also investigated the motivation for specific choices of foods and beverages, and thus, conclusions could be made for motivations related to food groups.

The results of the Food Choice Map technique were the valuable contribution of this project into understanding food behavior and providing helpful inputs for changing people's diet toward a more healthful direction. By using the interview technique, this method not only explored the reasons underlying food choice but also the context of that food consumption. Due to the time constraint and expectation of a 'quick' response from the interviewer, the

interviewees often gave responses of what come first in their mind, which normally was what important to them. This may be why the FCM only found fifteen motivations as compared to seventeen motivations in the two surveys. It also may be because in the survey questionnaire the respondents were provided with answer cues (the measuring scales) and when they had to answer themselves those topics were not primary in their minds. The FCM also suggested that different eating styles should be taken into account for food development and intervention programs for healthy eating. 'Routine' was the first concern in the personal food system (Connors, Bisogni, Sobal, & Devine, 2001; Furst, Connors, Bisogni, Sobal, & Falk, 1996; Jastran, Bisogni, Sobal, Blake, & Devine, 2009) and people with this eating style would be more difficult to change their diets than others. It would take less effort to change eating behavior of people who tried to alternate their foods and who were variety seeking type. Besides, different strategies should be used for people who were already healthy-oriented and people who were eating for pleasure because 'maintaining the current eating' should be the goal for health-oriented people and 'changing current eating' would be the consider for people eating for pleasure.

Conclusions

Motivations for choosing foods for different eating occasions at different times of the day have been thoroughly investigated by three different methods using two psychological approaches: bottom-up and top-down. Liking was the number one motivator for food choices in most situations. However, physiological or functional motives were additional main drivers for morning eating and psychological or mental motives were additional underpinnings of choices for evening eating. The bottom-up approach, especially when incorporated in the in-depth interview-based Food Choice Map technique, provided reliable and valid results as the top-down

approach that is often used in research about food choice. This project advanced the knowledge of food choice domain and encouraged investigating food choice from different perspectives.

References

Bellisle, F., Dalix, A., Mennen, L., Galan, P., Hercberg, S., De Castro, J., & Gausseres, N. (2003). Contribution of snacks and meals in the diet of French adults: A diet-diary study. *Physiology & Behavior, 79*, 183-189.

Bellisle, F. (2014). Meals and snacking, diet quality and energy balance. *Physiology & Behavior, 134*, 38-43.

Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., & Devine, C. M. (2007). Dimensions of everyday eating and drinking episodes. *Appetite, 48*, 218-231.

Connors, C. A., Bisogni, J., Sobal, C. M., & Devine. (2001). Managing values in personal food systems. *Appetite, 36*, 189-200.

Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet Research, 15*, 195-219.

Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: A conceptual model of the process. *Appetite, 26*, 247-266.

Huang, H. (2006). Do print and web surveys provide the same results? *Computers in Human Behavior, 22*, 334-350.

Jackson, B., Cooper, M. L., Mintz, L., & Albino, A. (2003). Motivations to eat: Scale development and validation. *Journal of Research in Personality, 37*, 297-318.

Jastran, M. M., Bisogni, C. A., Sobal, J., Blake, C., & Devine, C. M. (2009). Eating routines. embedded, value based, modifiable, and reflective. *Appetite, 52*, 127-136.

Kinchla, R., & Wolfe, J. (1979). The order of visual processing: "Top-down," "bottom-up," or "middle-out". *Perception & Psychophysics, 25*, 225-231.

Le, S., Josse, J., & Husson, F. (2008). FactoMineR: An R package for multivariate analysis. *Journal of Statistical Software, 25,* 1-18.

Lefever, S., Dal, M., & Matthiasdottir, A. (2007). Online data collection in academic research: Advantages and limitations. *British Journal of Educational Technology, 38,* 574-582.

Letarte, A., Dube, L., & Troche, V. (1997). Similarities and differences in affective and cognitive origins of food likings and dislikes. *Appetite, 28,* 115-129.

Lindeman, M., & Väänänen, M. (2000). Measurement of ethical food choice motives. *Appetite, 34,* 55-59.

Peters, G. R., Rappoport, L. H., Huff-Corzine, L., Nelsen, C., & Downey, R. G. (1995). Food preferences in daily life: Cognitive, affective and social predictors. *Ecology of Food and Nutrition, 33,* 215-228.

Rappoport, L., Downey, R. G., & Huff-Corzine, L. (2001). Conceptual differences between meals. *Food Quality and Preference, 12,* 9-17.

Renner, B., Sproesser, G., Strohbach, S., & Schupp, H. T. (2012). Why we eat what we eat. the eating motivation survey (TEMS). *Appetite, 59,* 117-128.

Roininen, K., Lähteenmäki, L., & Tuorila, H. (1999). Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite, 33,* 71-88.

Sabatier, P. A. (1986). Top-down and bottom-up approaches to implementation research: A critical analysis and suggested synthesis. *Journal of Public Policy, 6,* 21-48.

Sevenhuysen, G. P., & Gross, U. (2003). Documenting the reasons people have for choosing their food. *Asia Pacific Journal of Clinical Nutrition, 12,* 30-37.

Shuaibi, A. M., Sevenhuysen, G. P., & House, J. D. (2008). Validation of a food choice map with a 3-day food record and serum values to assess folate and vitamin B-12 intake in college-aged women. *Journal of the American Dietetic Association, 108*, 2041-2050.

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite, 25*, 267-284.

Wright, K. B. (2005). Researching internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-Mediated Communication, 10*. Retrieved at http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2005.tb00259.x/full.

Chapter 6 - General conclusions

The goal of this research project was to give insight into understanding why people eat what they do. This project has found at least seventeen motivational factors responsible for choices of foods and beverages in different eating occasions. These factors are: liking, habits, need and hunger, convenience, price, health, weight control, natural concerns, visual appeal, affect regulation, pleasure, traditional eating, sociability, social image, social norms, variety seeking, and choice limitation. However, these factors play different roles in each of food choices depending on the context of eating and the type of foods.

Liking or sensory acceptance is confirmed as the primary motivation in food choice. Regardless of the eating context, food has to meet certain expectations about its perceived sensory properties (taste) to be chosen. This confirmation might not be good news for dieticians, nutritionists and anyone who works in the health department that are trying to direct people to healthy eating, because many studies have reported that people normally associate healthy foods with distaste. Therefore, unless there is way to make all healthy/low-calories foods tasty, the battle with chronic diseases that caused by overeating will continue to be difficult.

After liking, foods for breakfast and lunch are mainly chosen because of need and hunger, convenience and habits. Food choices for dinner are driven by variety seeking, traditional eating, price, and sociability. Choices for morning and afternoon snacks are made based on the concerns of weight control and health, but late-night snack choices often are purely because of pleasure and visual appeal. Meals and snacks are different in the number of motivations involved in each of the choices. Choices for meals are more complicated, incorporating more motivation factors and a variety of food groups while choices for snack involved fewer motivation factors and fewer food groups.

Different food groups are also associated with different motivations. People associated nuts, seeds, vegetables, fruits, dairy, egg, and breakfast cereal mainly with health and weight control while sweets were associated with pleasure. Meat, baked products, snacks, pasta, and "fast" foods are chosen due to need and hunger, liking, convenience, price, and pleasure.

Different eating styles are also explored for Kansans in the Mid-West of the U.S. They were: routine (consumed only a few fixed food items), moderate alternative (alternately consumed a moderate amount of food items), and variety seeking (varied foods every day and had many choices for every meal). 'Healthy' and 'pleasure' eating are found to be two main orientations shaping the respondents' dietary behavior.

This project introduces a new perspective to investigate food choice. Thus far the most common approach to food choice is in the form of top-down processing such as "I eat healthy, therefore food I eat has to be …" This is often seen from all the questionnaires and scales developed to measure food choice as well as dietary advices that go with "This food is healthy therefore you should eat it". This approach is called top-down because it starts with a belief about eating then goes down to deciding what to eat or what should be eaten. This approach has been invaluable in research of food choice because it has brought in lots of knowledge in the field up to this day and would continue so in the future due to its ease in execution. However, this approach has been criticized on the use of self-report procedure which causes it to lose control of the responding process. Besides, in application, dietary advice using this approach has not proved to be successful because the number of overweight and obese people keeps increasing around the world.

From cognitive and behavioral psychology we learn that behavior should be studied using behavior observation approach, which provides validity for the results. However, investigating

reasons for that behavior needs self-report. We need the person to tell us. This could not be explored by any other method. Therefore, the best approach to understanding food choice would be a combination between actual choice observation and interview at the moment the choice is made. Unfortunately, this is expensive and not always feasible.

This research project introduced a new angle to look at food choice. Instead of looking down, we 'looked up'. We started with the specific choice, say an apple, to examine the eating orientation. In other words, a bottom-up approach that can be conveyed as "I eat vegetables, therefore I eat healthy". The methods were to engage respondents to specific choices of food and beverage items they have made very recently to approach the motivation constructs underlying their food choice in general. This approach provides certain validation for the results based on the nature of the choices reported and the motivation and context of eating reported for it. For instance, it's convincing to find coffee and oatmeal are consumed at breakfast, and the reasons are 'because it's quick to prepare', 'usually have it', or drinking water for dinner 'because it's low in calories'. The motivations are associated with specific items and eating context and thus it could be justified based on knowledge about that item and eating context. The methods used in this study, in some way, approach the ideal methodology that combine both actual choice and self-report reasons extracted by in-depth interview. Besides, making qualitative research tool into a quantitative tool is another contribution of this study into the field.

Appendix A - The Eating Motivation Survey (Chapter 2 & 3)

Participant #:……Date……

Please tell us some information about yourself. This information will only be used for the purpose of this study.

1. **What is your gender**? (Check one): ☐ male ☐ female
2. **Which of the following best describes your age?** (Check one)

   ☐ 18 or younger ☐ 19 - 22 ☐ 23 - 44 ☐ 45 – 60 ☐ 61 or older
3. **How long have you been living in the United States?** (Check one)
   ☐ 0-5 years ☐ more than 5 to 10 years
   ☐ 10 years or more ☐ all my life
4. **What is your race/ethnicity?** (Choose all that apply)

   ☐ Hispanic/Latino ☐ Native Hawaiian or Pacific Islander ☐ American Indian or Alaska Native

   ☐ White ☐ Asian ☐ Indian

   ☐ Black or African American ☐ Prefer not answer
5. **Please indicate where you currently live**:
   City:_____

   State:_____
6. **How many individuals over 18 years old live in your household (yourself included)?** _____
7. **How many individuals under 18 years old live in your household (yourself included)?** _____
8. **Which of the following best describes your employment status?** (Check one)

   ☐ employed, full time ☐ employed, part time ☐ unemployed

   ☐ Homemaker ☐ retired
9. **Are you currently a full time student?** (check one)
   ☐ Yes ☐ No
10. **Which of the following best describes your total household income during the past 12 months?** (Check one)

    ☐ ≤ 25,000 ☐ 25,001 – 49,999 ☐ 50,000 – 74,999

    ☐ 75,000 – 99,999 ☐ 100,000 – 124,999 ☐ 125,000 – 149,999

☐ ≥ 150,000 ☐ prefer not answer

Now think about your most recent meal and answer the following questions.

1. **That meal was**: (check one)
   ☐ Breakfast ☐ Lunch
   ☐ Dinner ☐ Snack
   ☐ Other (please specify……)
2. **Where did you eat that meal?** (check one)
   ☐ At home
   ☐ At work
   ☐ At a restaurant, including fast food restaurants
   ☐ On the go
   ☐ At a coffee shop
   ☐ Other (please specify ……)
3. **With whom did you eat that meal?** (check all that apply)
   ☐ Alone
   ☐ With family
   ☐ With friend(s)
   ☐ With co-worker(s)/colleagues
   ☐ With client(s)
   ☐ Other (please specify ……)
4. Which of the following best describes the time when you ate that meal? (check one)
   ☐ Before 8 AM
   ☐ 8 – 10 AM
   ☐ 10 – 11 AM
   ☐ 11 AM – 1 PM
   ☐ 1 – 3 PM
   ☐ 3 – 5 PM
   ☐ 5 – 6 PM

☐ 6 – 8 PM

☐ After 8 PM

5. **List all the food items and beverages that you ate in that meal. Also give the number of other options available that you could have substituted for this food/beverage (consider only those foods/beverages you could have reasonably eaten/drunk instead of this food/beverage)**
   (in case you did not eat up to 7 items, leave the space that you don't use blank;
   If you ate more than 7 items then choose to report only 7 items):
   Example: Food item #1: Apple
   Number of alternatives: 3 (this means for that specific meal, you had 3 choices that you would consider an alternative for the apple, e.g. orange, fries and chips, and you chose to eat apple, instead of the other three). Put 0 if you had only one choice.

Item #1:_____Number of alternatives:_____

Item #2:_____Number of alternatives:_____

Item #3:_____Number of alternatives:_____

Item #4:_____Number of alternatives:_____

Item #5:_____Number of alternatives:_____

Item #6:_____Number of alternatives:_____

Item #7:_____Number of alternatives:_____

6. **For each food item that you ate for the meal you stated above, provide the reasons why you chose to eat it** (Check all that apply). **If this was something you already purchased, please indicate reasons why you initially bought it as well as the reasons you chose to**

eat it at this time. If you ate it away from home, please include the reasons you ate elsewhere for those foods/meals.

(*in case you did not eat up to 7 items, leave the questionnaires that you don't use blank*)

Item #1: _____

I eat this food …	
. . . because I am accustomed to eating it	☐
. . . because it is healthy	☐
. . . because it is quick to prepare	☐
. . . because it tastes good	☐
. . . in order to indulge myself	☐
. . . because it is natural (e.g. not genetically modified)	☐
. . . because I don't want to spend any more money	☐
. . . because it is low in calories	☐
. . . because I am frustrated	☐
. . . because it makes me look good in front of others	☐
. . . because it would be impolite not to eat it	☐
. . . because the presentation is appealing (e.g. packaging)	☐
. . . so that I can spend time with other people	☐
. . . because it is organic	☐
. . . because I grew up with it	☐
. . . because I enjoy it	☐
. . . because I'm hungry	☐
. . . because I usually eat it	☐
. . . because I have an appetite for it	☐
. . . because it is easy to prepare	☐
. . . because I am sad	☐
. . . because it is low in fat	☐
. . . because I recognize it from advertisements or have seen it on TV	☐
. . . because it makes social gatherings more comfortable	☐

. . . because I am supposed to eat it	☐
. . . because others like it	☐
. . . because I feel lonely	☐
. . . because I watch my weight	☐
. . . because it contains no harmful substances (e.g. pesticides, pollutants, antibiotics)	☐
. . . because it is the most convenient	☐
. . . because I need energy	☐
. . . because I am familiar with it	☐
. . . because I like it	☐
. . . because it is pleasantly filling	☐
. . . in order to reward myself	☐
. . . out of traditions (e.g. family traditions, special occasions)	☐
. . . because it belongs to certain situations	☐
. . . to maintain a balanced diet	☐
. . . because it is social	☐
. . . because it is inexpensive	☐
. . . because it spontaneously appeals to me (e.g. situated at eye level, appealing colors)	☐
. . . to avoid disappointing someone who is trying to make me happy	☐
. . . because it is trendy	☐
. . . because it is on sale	☐
. . . because it keeps me in shape (e.g. energetic, motivated)	☐

Notes: The above TEMS were repeated in random orders for the rest of the food and beverage items reported by the respondent, depending on the number of the items, for instance, if someone reported 4 items for a meal then he/she filled out 4 TEMS questionnaires.

Appendix B - Interviewer's guide for the food choice map (Chapter 4)

PREPARATION BEFORE PARTICIPANTS COME:

Write participant number, interviewer number, date and time on note-cards and glue it on the corresponding spots on the map. (*This is because we have to re-use the map for other participants*)

A. INTRODUCTION. (5 minutes)

Greetings: Hello, My name is …….. I'm very glad to have you today for an interview for about 90 minutes. I'm under contract to collect research information about the foods you consume in a usual week and your reasons of consumption those foods. In this interview, you will also participate in some activities. This is going to be an open conversation. There is no right or wrong answer. I'm interested in hearing every opinion of yours about the topic.

I would like to thank you for taking the time out of your day to come talk with me and share your opinions today.

This session is being audio taped so that I can review what was said, not who said what. The tapes will be for my reference as I summarize what we talk about today and will not be distributed for any other use.

Please briefly introduce yourself. (*First Name, and what you like to do in your free time)*

To start up, I would like to ask you to do a small activity.

B. CONSTRUCT THE FOOD CHOICE MAP AND DISCUSS FOOD CONSUMPTION IN A USUSUAL WEEK (75 minutes)

Hand the respondent a stack of the food pictures and introduce her/her to the FCM worksheet on the wall.

Ask the respondent to sort out the food items that they **don't eat ever, rarely eat** and **often eat** (consider all meals).

Ask the respondent to pick out the food image that represent the **typical foods** he/she often eat in a week and use the temporary glue to stick it vertically in a place (on the FCM worksheet) to reflect the time of day of consumption, and horizontally in the place to reflect the number of days

in a usual week, ranging from 1 to 7, that the respondent ate the food at that mealtime (by 6, 6-8am, 8-10 am, 10-12, ...; morning, noon, afternoon, evening, late-night).

- Make it clear to the respondent that the picture is just a stylized symbol for a food, not a true reflection of the item.
- If they cannot find any picture that could represent the food that they ate, ask them to write down the name and give brief description on a note card and stick on the map along with other pictures.
- The foods eaten less than once per week should not be recorded, except for the foods that are socially or emotionally important to the respondent. => Record these in the extreme left hand margin or zero column.
- Encourage the respondent to be active in creating his/her own map: they are allowed to move the food symbols around until satisfied with the map; ask to double check if the food symbols are placed correctly to reflect time and frequency of consumption.
- Record social information on the FCM map as the conversation goes on: use glue to stick GREEN pieces of paper on the food items that were eaten with friends or colleagues, Red paper on foods eaten with family. Leave out the Foods eaten alone.

POBA QUESTIONS FOR DISCUSSION OF FOOD CONSUMPTION (questions can be asked in different order or ignored depends on how the interview goes and time)

* Turn on the Audio-recording in Notability in the iPad. Note the participant number and date.

Based on the food choice map that the respondent creates:

1. **Help me to name each of the meal** you have for morning, afternoon and evening meals, **Write the name on a blank note-card and glue on the map (DO NOT WRITE ON THE MAP)**– *(breakfast, mid-morning snack, brunch, lunch, mid-afternoon snack, dinner, late-night snack or other names*).
2. *Now tell me about the food items that you ate for breakfast this morning? (take notes)
3. *compare to the food items for breakfast on the map, if the recalled are different, ask why different?
4. What reasons do you have for choosing _____(*point to one food picture on the map and say a food's name out loud for the audio recordings*)____(2)___times for **breakfast (using the name they indicate above) *(brunch/morning snack/ lunch/afternoon snack/dinner/ late night snack)***. Look for:

1. Liking (like, appetite, tastes good)
2. Need and Hunger (need energy, pleasantly filling, hungry)
3. Health (balanced diet, healthy, keeps in shape)
4. Convenience (convenient, quick to prepare, easy to prepare, someone made it)
5. Habits (accustomed to eating it, usually eat, familiar)
6. Pleasure (enjoy, indulge, self-reward)

7. Traditional Eating (belongs to certain situation, traditions, grew up with)
8. Natural Concerns (natural, no harmful substances, organic)
9. Sociability (social, spend time with others, social gatherings more comfortable)
10. Price (inexpensive, don't want to spend more money, on sale)
11. Visual Appeal (packaging is appealing, appealing color, situated at eye level, recognized from ads, TV)
12. Weight Control (low calories, weight watch, low in fat)
13. Affect Regulation (sad, frustrated, lonely)
14. Social Norms (impolite not to eat, disappointing someone, supposed to eat)
15. Social Image (trendy, look good in front of others, others like it)
16. Choice Limitation (only choice, no other choice, what is served)
17. Variety Seeking (don't want to eat the same thing, like to eat variety)
18. Other reasons……..

***ASK additional questions based on the answers to find the Motivations **BUT NOT** lead the respondent to any of those motivations.

For example, if someone says "I eat this food because I like it" *(Do expect this to happen often),* then you say: So aside from liking, what other reasons do you have for eating/drinking ……(*orange juice*)? Then they say something, then you ask: what else? If they say: That's all I have (or that's it or I don't know) then you can confirm: are those the only reasons you have for choosing ……..(*orange juice*) …..(2) times per week for …..(*breakfast)*? If the answer is No, then you explore more motivations, if YES, then you ask: "**what are the reasons that you did not eat/drink something else?"**

***Avoid questions with leading STEMs such as: "Can you.."; 'Could you…"; Do you…"; "Did you…"; "Are you …"; "Will you…"; "Should you…"; "Would you…"; "Is this…"; "Are they…"; Can't you…"; "Won't you …".

5. Where do you eat **breakfast** (*Use the name the participant used for each meal)*? Reasons?
    a. If the answer is at home, then ask if they prepare it themselves or someone makes it
    b. If they prepare it themselves, then ask how long it normally takes?
    c. If the answer is at a restaurant, then ask what kind of restaurant? how often? How long spending to eat there?

****Repeat the above questions for OTHER MEAL (mid-morning snack, lunch, mid-afternoon snack, dinner, late night snack).**

D. THE FOOD MOTIVATION SURVEY (TEMS) (20 minutes)

Put in the respondent's number and your name on the survey questionnaire in the iPad first, then move to next page and give it to the respondent. Ask him/her to consider all the foods that he or she consumed (on the food choice map) that have been discussed early on, and fill out 6 TEMS questionnaire for breakfast, mid-morning snack, lunch, mid afternoon snack, dinner and late night snack.

E. CLOSING AND WRAPPING UP (5 minutes)

What an interesting talk we have today. Do you have any question for me?

**** Listen to the question and answer (avoid talking detail of the study).*** *Simply says this is for a research project about people's eating habits from Human Nutrition department.*

Thank you so much for your time and your inputs.

There are a few things I would like to remind you of before you leave today:

Remember, please do not discuss anything you have talked about today with anyone outside of this room. We appreciate your help in maintaining confidentiality.

Appendix C - TEMS questionnaires used in the survey applied to eating occasions (Chapter 5)

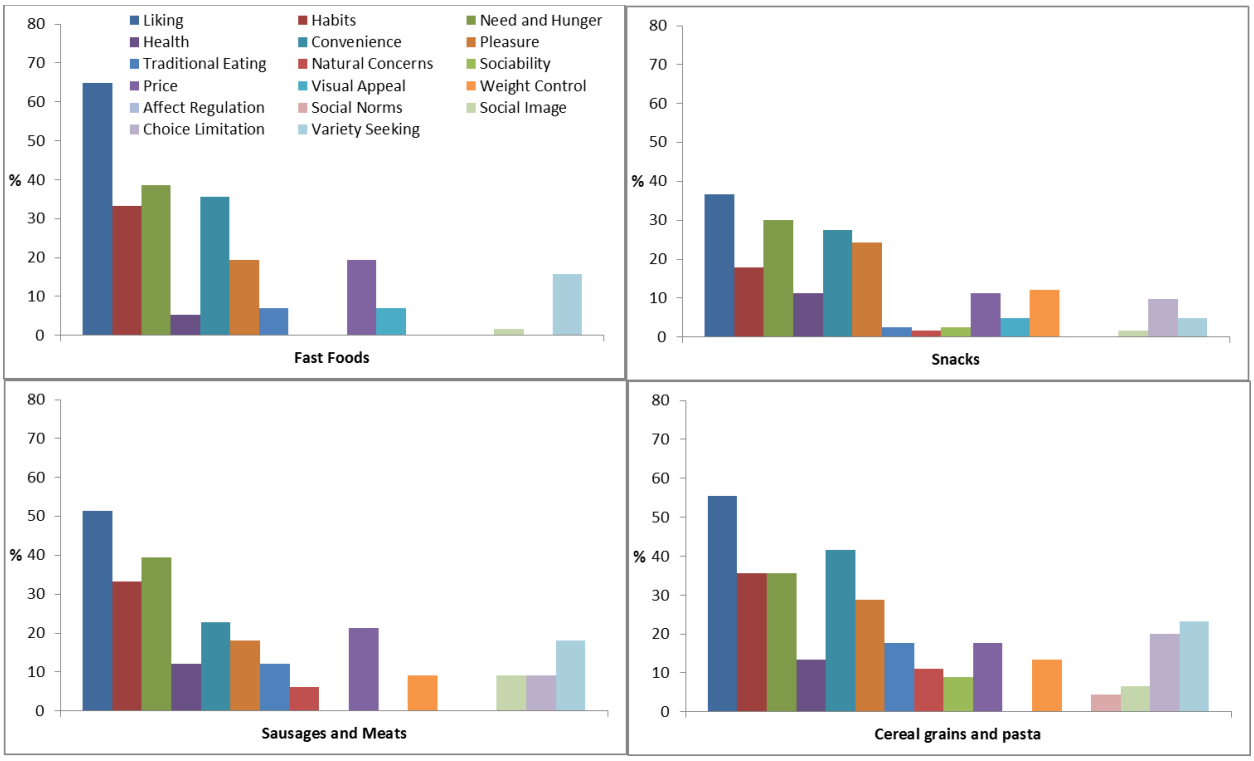
The following questionnaire was used for BREAKFAST. Similar questionnaires (subscales appeared in random order) were also used for other eating occasions: mid-morning snack, lunch, mid-afternoon snack, dinner, and late night snack.

I eat those foods for breakfast …	
. . . because I am accustomed to eating it	☐
. . . because I don't want to spend any more money	☐
. . . because I am frustrated	☐
. . . because I am sad	☐
. . . because I grew up with it	☐
. . . because I usually eat it	☐
. . . because I watch my weight	☐
. . . because I'm hungry	☐
. . . because it belongs to certain situations	☐
. . . because it contains no harmful substances (e.g. pesticides, pollutants, antibiotics)	☐
. . . because it is easy to prepare	☐
. . . because it is healthy	☐
. . . because it is inexpensive	☐
. . . because it is low in calories	☐
. . . because it is low in fat	☐
. . . because it is natural (e.g. not genetically modified)	☐
. . . because it is on sale	☐
. . . because it is organic	☐
. . . because it keeps me in shape (e.g. energetic, motivated)	☐
. . . because it makes me look good in front of others	☐
. . . because it makes social gatherings more comfortable	☐

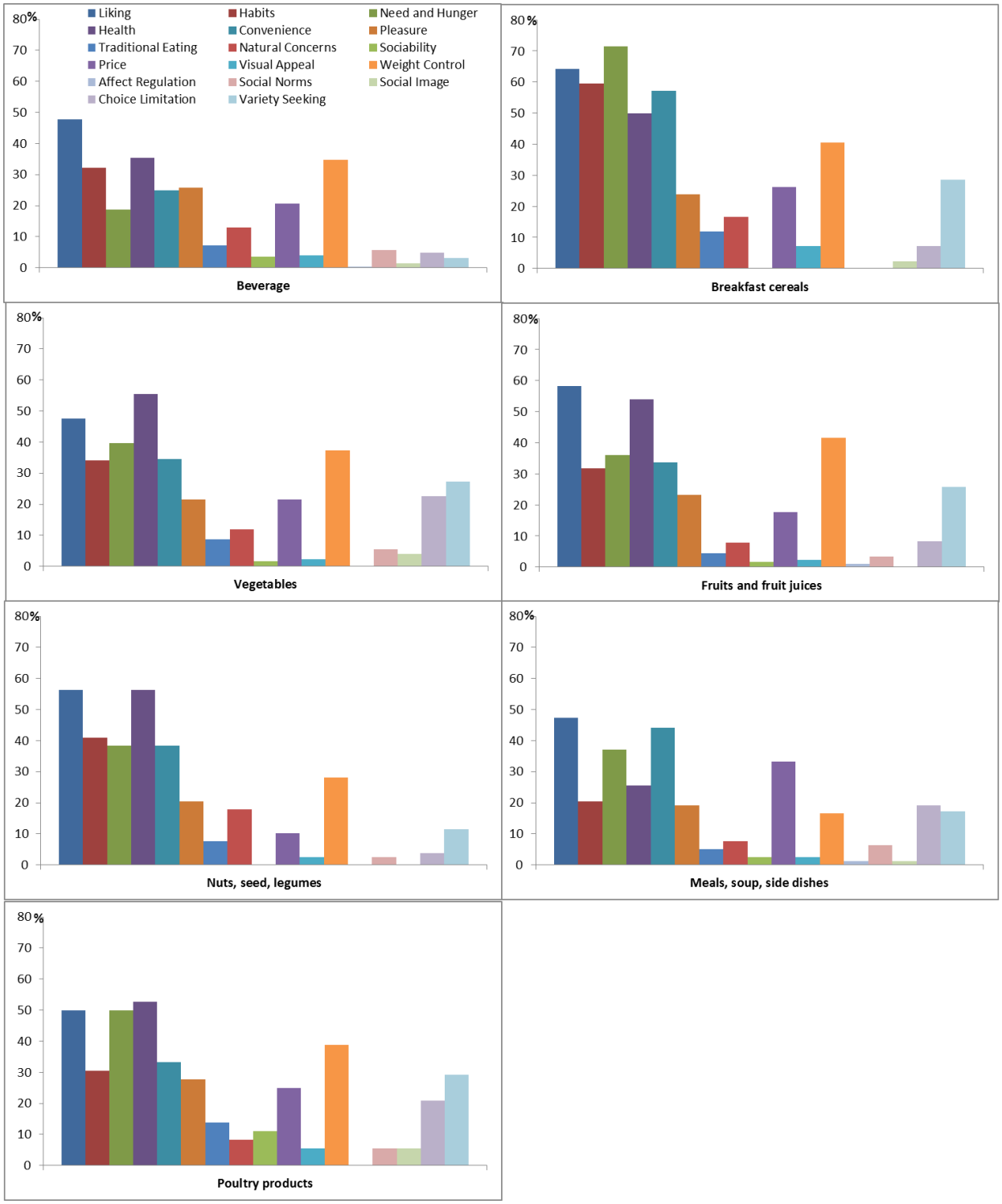
. . . because it spontaneously appeals to me (e.g. situated at eye level, appealing colors)	☐
. . . because it is social	☐
. . . because I need energy	☐
. . . because I recognize it from advertisements or have seen it on TV	☐
. . . because I am supposed to eat it	☐
. . . because the presentation is appealing (e.g. packaging)	☐
. . . in order to reward myself	☐
. . . to avoid disappointing someone who is trying to make me happy	☐
. . . because it is the most convenient	☐
. . . because it is trendy	☐
. . . because it is pleasantly filling	☐
. . . because it is quick to prepare	☐
. . . because it tastes good	☐
. . . because I enjoy it	☐
. . . because I feel lonely	☐
. . . because I am familiar with it	☐
. . . because I have an appetite for it	☐
. . . because I like it	☐
. . . because it would be impolite not to eat it	☐
. . . because others like it	☐
. . . in order to indulge myself	☐
. . . out of traditions (e.g. family traditions, special occasions)	☐
. . . so that I can spend time with other people	☐
. . . to maintain a balanced diet	☐
. . . because it is what is served	☐
. . . because someone made it for me and it is what is available	☐
. . . because I like to eat a variety of different foods each day	☐
. . . because I don’t like to eat the same food for breakfast everyday	☐

Appendix D - Motivation patterns for the other food groups presented in chapter 3

CLUSTER 1



CLUSTER 2


Liking
Habits
Need and Hunger
Health
Convenience
Pleasure
Traditional Eating
Natural Concerns
Sociability
Price
Visual Appeal
Weight Control
Affect Regulation
Social Norms
Social Image
Choice Limitation
Variety Seeking
80%
70
60
50
40
30
20
10
0
Beverage
Breakfast cereals
Vegetables
Fruits and fruit juices
Nuts, seed, legumes
Meals, soup, side dishes
Poultry products