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Acculturation, meal frequency, eating-out, and body weight in Korean Americans

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Abstract

Consuming regular meals has been studied in relation to better health, while higher regularity of eating-out has been linked to obesity. This study examined whether acculturation was associated with regularity of meals, eating-out, and overweight in Korean Americans. Pre-tested questionnaires were mailed to a U.S. national sample with Korean American surnames, and 55% of the deliverable sample responded, producing 356 usable questionnaires. Acculturation was measured using a two-culture matrix model and Gordon's theoretical work, and showed there were three distinct groups (acculturated, bicultural, and traditional). Only 36% reported that they regularly ate three meals a day. Breakfast was the least frequent meal of the day with 43% reporting eating breakfast everyday. More than half (58%) reported that they usually eat out or get take-out food at least once a week. After controlling for age, sex, income, education, and working status, higher acculturation was related to greater regularity of eating-out, but not meal regularity. A total of 28% of men and 6% of women were overweight (BMI>25), and there were significant and positive relationships between body weight status and acculturation in men but not women. However, no significant relationships between frequency of meals and eating-out and overweight status were present. This study did not find significant relationships of meal regularity and eating-out with body weight, however, given the positive relationship between acculturation and eating-out among the subjects and the well-established relationship between eating-out and obesity, nutrition education about skipping meals and eating-for Korean Americans may be useful to prevent such relationships from developing.

Key Words: Acculturation, meal-regularity, eating-out, obesity, Korean Americans

Introduction

Obesity is a growing problem in the United States (Flegal *et al*., 1998; Kuczmarski *et al*., 1994; Mokdad *et al*., 2001; Ogden *et al*., 2006). Among many determinants of obesity, frequency of meals, snacking, and eating-out have attracted research and practical interests because of their direct applicability to everyday life.

Fabry and co-workers reported that eating small frequent meals (nibbling) was strongly associated with lower body weight than eating large few meals (gorging) (Fabry *et al*., 1964, 1966; Hejda & Fabry, 1964). But, the inverse relationship between meal frequency and body weight has not been consistently found in recent other studies in population studies (Charzewska *et al*., 1981; Dreon *et al*., 1988; Edelstein *et al*., 1992; Metzner *et al*., 1977; Summerbell, 1996). Nibbling did not produce better results in weight loss than gorging in clinical studies, when the amount of total energy was restricted (Finkelstein & Fryer, 1971). Bellisle *et al.* (1997) concluded in their review paper that nibbling does not have energy metabolic advantages in terms of energy utilization over gorging.

It has also been hypothesized that eating frequent meals may result in higher amount of energy than eating infrequent meals, however, data on this hypothesis is relatively limited. Kant (1995) reported that energy intake was positively associated with meal frequency in the National Health and Nutrition Examination and Survey I Epidemiologic Follow-up Study. However, energy intake levels in the dataset were below the predicted minimal energy needs (1.4 * BMR) (Goldberg *et al*., 1991). With limited data availability and imprecision of dietary assessment methods, it is not clear if more frequent meals result in higher energy intakes.

Snacking has been discussed in relation to obesity in similar ways to meal frequency has. Snacking has sometime been studied in the context of meal frequency, because definitions of meals or snacking have not been fully established (Gatenby, 1997). Booth (1988) proposed that snacking in addition to meals may lead to higher energy intake. High-fat, high-sugar and high-energy foods are often associated with snacking, possibly resulting in consuming "empty calories (Drummond *et al*., 1996)." Studies on whether frequent meals or snacking leads to higher energy consumption reported mixed results (Kirk, 2000; Lioret *et al*., 2008).

Eating-out is one of the significant phenomna in the industrialized and modernized society (Finklestein, 1989). In the U.S., about half of the food expenditures of adults are spent eating away from home (Blisard *et al*., 2002; Clausen, 2000). In the U.K., eating-out became much more commonplace at the

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end of the twentieth century (Warde & Martens, 2000). Eating-out is thought to be associated with obesity because foods eaten away home tend to be in larger portion size and higher fat and energy content (Ma *et al.*, 2003; Young & Nestle, 2002). If and how frequent eating-out is related to body weight, however, has not been fully studied.

Frequency of meals, snacking, and eating-out are determined by many factors. Culture is an important determinant because it dictates how one carries out daily life. Immigrants and their children provide unique information on relationships among meal frequency, snacking, eating-out, and body weight, because people acculturate in different speed and patterns. Acculturation refers to a process of overall adaptation on both individual and group levels, including cultural, psychological, social, economic, and political aspects (Berry, 1997). Since current international migration flows from undeveloped or developing countries to developed countries, immigrants and their children may be in different stages of showing changes from industrialization and modernization.

This study examined whether acculturation was associated with meal frequency, snacking, and eating-out and whether meal frequency, snacking and eating-out were related to weight status using Korean Americans as an example. Specifically, we hypothesized that: 1) higher acculturation is related to lower meal frequency, more frequent snacking, and more frequent eating-out and 2) lower meal frequency, more frequent snacking, and more frequent eating-out are associated with higher prevalence of overweight.

Subjects and Methods

Data for this study were collected by a cross-sectional mail survey of a national sample of Korean Americans in the continental U.S. University Institutional Review Board (IRB) approval was obtained prior to the study.

Sample

Adult (17 years old or older) Korean Americans were randomly sampled from U.S. telephone book white pages. Korean surnames were used to target ethnicity and the listing was screened to make sure that only people with Korean surnames were included.

The sample was stratified by four variables: 1) region (Northeastern, Midwestern, Southern, and Western following the National Health and Nutrition Examination and Survey (U.S. Department of Health and Human Services. 1981)), 2) urban-rural area (Standard Metropolitan Statistical Area (SMSA) and non-SMSA), 3) age as a proxy for generation (under 35 years and over 35 years), and 4) gender (male and female).

Data collection procedure

The pre-tested questionnaire was mailed to a total of 1113 people with Korean surnames in the continental U.S., following the Total Design Method of Dillman (1978). A personally addressed cover letter in both English and Korean explaining the purpose of the study was sent along with two questionnaires (in English and Korean). Non-respondents received reminder postcards followed by second and third mailings.

Out of the 1113 questionnaires mailed out, 259 (33%) were returned as undeliverable. Of the 854 deliverable questionnaires, 470 (55% of the total deliverable sample) responded, with 105 who responded that they were not Korean Americans and two who refused to participate. After careful screening, 16 questionnaires were determined to be unusable. This analysis used a total of 347 questionnaires, which was 42% of the total deliverable sample. The respondents did not show significantly different patterns from the sampling list distribution by region, area, or gender.

Measures

There are no widely accepted acculturation scales for Korean Americans. In this study, a bidimensional model (Berry, 1997) provided a framework and Gordon's seven dimensions (Gordon, 1964) were used to identify variables to measure overall acculturation in Korean Americans. Each dimension was independently measured in two axes: relation to American society and retention of Korean ethnic society. Cluster analysis on acculturation resulted in three distinct groups: acculturated, bicultural, and traditional (Lee *et al.*, 2000; 2003).

Acculturated Korean Americans were either born in the U.S. or immigrated to the U.S. when they were very young. Generally, they were most comfortable with American society compared to the other acculturation groups. They tended to have high English fluency and low Korean fluency. The largest, traditional group was situated on the opposite end from the acculturated group. They came to the U.S. during their late 20s or early 30s. They were more likely to have limited English proficiency and felt most comfortable with Korean culture and environments. The bicultural group appeared to be in between the acculturated and the traditional group, however, it was notable that the bicultural group had a wider social network and social participation with American mainstream than the acculturated group. More detailed information on acculturation scale and acculturation groups can be found elsewhere (Lee *et al.*, 2000).

Frequency of meal was estimated by asking how often respondents eat breakfast, lunch, and dinner. Response categories were never, once a week or less, 2~3 times a week, 4~6 times a week, and everyday. Response categories were re-coded because of low frequencies in some of the categories. "Never" and "once a week or less" category for regularity of lunch were combined together, leaving "once a week or less," "2~3 times a week," "4~6 times a week," and "everyday." Response categories for regularity of dinner were re-coded into three response categories with the first three categories ("never," "once a week or less," and "2~3 times a week") collapsed. Frequency

of snacking was also asked using the same response categories. With responses for frequency of breakfast, lunch, and dinner, a new variable (daily frequency of meals) was created. Respondents who reported eating each meal everyday were given a score of 1 for each meal, while others received a score of 0. Combining the scores for three meals produced a value for frequency of meals, ranging from 0 to 3; a value of 0 would mean a respondent did not have regularly established meal frequency, while a value of 3 would mean a respondent had a regularly established meal frequency of three. There were few respondents with a value of 0, therefore, they were combined with those with a value of 1.

Eating-out behaviors was determined by asking how often respondents eat out or take out from restaurants: never or rarely, 1~2 times a month, about once a week, 2~3 times a week, and almost everyday.

Weight status was determined by calculating Body Mass Index (BMI) with self-reported height and weight. BMI is a good indicator of adiposity and self reported height and weight have adequate validity for population studies (Bowman & DeLucia, 1992). Respondents were grouped by BMI into four groups: underweight (BMI<18.5), normal weight (18.5≤BMI<25), overweight (25≤BMI<30), and obese (BMI≤30) (WHO, 1998). In multiple logistic regressions, overweight individuals (BMI≤ 25) were compared to non-overweight individuals.

Control variables included sex, age, size of place of residence, education, income, working status, and marital status. Women were used as a reference category. Size of place of residence was divided into SMSA (0) vs non-SMSA (1) according to zip code of residence. Education was total years of formal education obtained in the U.S. or Korea. Income was measured as combined family income before tax, using nine categories. Income categories were re-coded to six categories because of low frequency in some of the categories. Working status was collapsed into two categories: currently working (1) and not working (0). Married people were treated as a reference category and all other categories were collapsed into unmarried.

Analysis

All analyses were performed separately for men and women. Chi-squares and analysis of variance with Scheffé test were used to examine bivariate relationships. Logistic regression (proportional odds model) was applied to simultaneously investigate the relationships of all study variables in multi-variable models.

Results

Descriptive information about the variables is presented in Table 1. About half of the sample's acculturation status was traditional, a third was bicultural and a sixth could be classified as acculturated. Men and women were similar in acculturation.

Table 1. Descriptive Characteristics of Respondents

	Male (201)	Female (146)	Total (347)
Acculturation	N (%)	N (%)	N (%)
Traditional	100 (49.8)	81 (55.5)	181 (52.1)
Bicultural	73 (36.3)	41 (28.1)	114 (32.9)
Acculturated	28 (13.9)	24 (16.4)	52 (15.0)
Socioeconomic Status			
Non-SMSA	58 (28.2)	29 (19.6)	87 (24.6)
Age (age, Mean ± SD)	43.2 ± 14.1	37.4 ± 12.7	40.7 ± 13.8
Education (years, Mean ± SD)	16.1 ± 3.1	15.0 ± 3.2	15.6 ± 3.2
Income (mean of 1~6 ± SD)	3.7 ± 1.6	3.5 ± 1.8	3.6 ± 1.7
Working* **	151 (73.3)	68 (46.0)	219 (61.9)
Unmarried	46 (22.3)	45 (30.4)	91 (25.7)
Weight Status***			
Average BMI (mean ± SD)	23.99 ± 2.96	21.72 ± 3.08	23.03 ± 3.21
Underweight (BMI<18.5)	4 (1.9)	13 (8.8)	17 (4.8)
Normal weight (18.5~25)	141 (68.5)	123 (83.1)	264 (76.6)
Overweight (25~30)	54 (26.2)	9 (6.1)	63 (17.8)
Obese (BMI>30)	7 (3.4)	3 (2.0)	10 (2.8)

* p<0.05; *** p<0.001: Significantly different by sex

Table 2. Frequency of Meals, Snacking, and Eating-out N (%)

	Male (201)	Female (146)	Total (347)
Frequency of Meals			
Once a day or less	58 (28.2)	46 (31.1)	104 (29.4)
Twice a day	76 (36.9)	52 (35.1)	128 (36.2)
Three times a week	72 (35.0)	50 (33.8)	122 (34.5)
Frequency of Breakfast			
Never	27 (13.5)	25 (17.2)	52 (15.1)
Once a week or less	28 (14.0)	19 (13.1)	47 (13.6)
2~3 times a week	30 (15.8)	26 (17.9)	56 (16.2)
4~6 times a week	25 (12.5)	18 (12.4)	43 (12.5)
Everyday	90 (45.0)	57 (39.3)	147 (42.6)
Frequency of Lunch			
Never	2 (1.0)	0 (0.0)	2 (0.6)
Once a week or less	3 (1.5)	2 (1.4)	5 (1.5)
2~3 times a week	8 (4.1)	10 (7.2)	18 (5.4)
4~6 times a week	37 (18.9)	21 (15.1)	58 (17.4)
Everyday	145 (74.4)	106 (76.3)	251 (75.2)
Frequency of Dinner			
Never	3 (1.5)	0 (0.0)	3 (0.9)
Once a week or less	2 (1.0)	2 (1.4)	4 (1.2)
2~3 times a week	4 (2.1)	1 (0.7)	5 (1.5)
4~6 times a week	15 (7.7)	20 (14.3)	35 (10.5)
Everyday	171 (87.7)	117 (83.6)	288 (86.0)
Frequency of Snack*			
Never	31 (18.9)	10 (8.1)	41 (14.3)
Once a week or less	23 (14.0)	15 (12.2)	38 (13.2)
2~3 times a week	46 (28.1)	42 (34.3)	88 (30.7)
4~6 times a week	15 (9.2)	22 (17.9)	37 (12.9)
Everyday	49 (29.9)	34 (27.6)	83 (28.9)
Eating-out			
Never or Rarely	17 (8.3)	15 (10.3)	32 (9.4)
1~2 times a month	64 (31.1)	52 (35.9)	116 (33.1)
About once a week	69 (33.7)	44 (30.3)	113 (32.2)
2~3 times a week	34 (16.5)	24 (16.6)	58 (16.6)
Almost everyday	21 (10.2)	10 (6.9)	31 (8.9)

* p<0.05: Significantly different by sex

Table 3. Relationships among acculturation, frequency of meals, eating-out, and weight status. (OR)

	Breakfast	Lunch	Dinner	Frequency of Meals	Snacking	Eating-Out	Overweight[a]		
Acculturation groups									
Acculturated vs. Traditional	1.32	1.16	1.68	1.43	2.15*	1.24*	2.42	2.90	2.83
Bicultural vs. Traditional	0.89	1.19	1.57	1.19	1.14	1.15	2.34*	2.53	2.48*
Acculturated vs. Bicultural	1.49	0.97	1.07	0.84	1.89	1.08	1.03	1.14	1.14
Men vs. Women	0.89	0.94	1.14	0.91	0.77	1.66*	-	-	-
Non-SMSA vs. SMSA	1.10	1.81*	1.43	1.55	1.12	1.51	1.07	0.96	0.98
Age	1.04***	1.00	1.01	1.02**	1.02	0.97***	1.03*	1.02	1.01
Education	1.05	1.00	1.04	1.01	0.97	1.13**	0.92	0.89	0.89
Income	1.00	0.98	1.15	0.99	0.96	1.26**	1.04	1.04	1.09
Working	1.46	0.86	0.56	1.09	0.77	0.88	1.11	1.24	1.08
Unmarried	0.91	0.57	0.45	0.67	1.27	3.37***	1.50	0.75	0.94
Frequency of Breakfast							ne[b]	0.86	ne
Frequency of Lunch							ne	0.61	ne
Frequency of Dinner							ne	3.65	ne
Frequency of Meal							ne	ne	0.93
Frequency of Snack							ne	1.33*	1.29
Eating-out							ne	1.07	1.03

[a] Only men were included in this analysis because of the small number of overweight women.; Three different models were created for the overweight variable.
[b] not entered into the model
* p<0.05; ** p<0.01; *** p<0.005

Most of the respondents (75%) resided in SMSA areas. The respondents reported average age of 40 years, average education of 16 years, and average income of approximately $35,000. The majority of them were working, while men were more likely working than women. About 75% were currently married.

Korean American men had significantly higher BMI than Korean American women. While more Korean American men (30%) were overweight than Korean American women (8%), more Korean American women were underweight (9%) than Korean American men (4%).

Only about a third reported that they ate three meals a day everyday (Table 2). Breakfast was the least frequent meal of the day with less than half reporting eating breakfast everyday. Dinner was the most frequent meal of the day with 86% eating dinner everyday. About a quarter of the respondents reported having a snack everyday, and women tended to snack more often than men (χ^2=11.025, p<0.05). More than half (58%) reported that they usually eat out or get take-out food at least once a week.

Since there were few significant and meaningful sex differences among acculturation, socioeconomic, meal frequency variables, further analyses were carried out with combined male and female respondents. In the case of analyses with weight status, the low prevalence of overweight and obesity among women forced the analyses done only in men. The overweight and the obesity category were collapsed into one because of low prevalence.

Relationships between acculturation and independent variables (frequency of meals, frequency of snack, and frequency of eating-out) were examined (Table 3). Controlling for sociodemographic variables (age, sex, size of place of residence, income, education, working status, and marital status), relationships between acculturation and frequency of snacking and eating-out were significant. Acculturated Korean Americans were more likely to eat snacks more frequently than traditional Korean Americans; however, significant relationships were not found for any other acculturation group comparisons. Acculturated Korean Americans were also more likely to eat out than traditional Korean Americans. Higher frequency of eating-out was also significantly associated with being men, younger age, higher income, and unmarried status.

After controlling for age, size of place of residence, income, education, working status, and marital status, bicultural men were more than twice as likely to be overweight than traditional men (Table 3). When frequency of each meal, snacking, and eating-out were entered into the model, only frequency of snacking was significant. Korean American men who snack more often were 1.3 times more likely to be overweight. When daily frequency of meals, rather than frequency of each meal, were entered to the model, only acculturation remained significant.

Discussion

This study examined how acculturation was related to frequency of meals, snacking, and eating-out behaviors in Korean Americans and whether frequency of meals, snacking, and eating-out were associated with body weight. Acculturation was not significantly associated with frequency of meals, but significantly

associated with frequency of snacking and eating-out. Acculturation also showed a significant relationship with body weight status in men. Multiple regression models showed that only frequency of snacking was significantly related to the likelihood of being overweight in men.

Acculturated Korean Americans tended to more frequently eat snacks and eat out than traditional Korean Americans. This relationship between acculturation and snacking and eat-out was also reported in Japanese Americans. Third-generation Japanese Americans were engaged in more frequent snacking and eating-out than second-generation Japanese Americans (Kudo *et al*., 2000). Japanese Americans also showed a significant and negative relationship between acculturation and meal frequency. These results seem to support that higher acculturation may lead to changes in daily eating patterns, which includes more eating occasions outside of traditional meals at home. Nutritional consequences of these changes warrant further studies.

It is worth mentioning that frequency of meals was not significantly related to most sociodemographic variables. Older Korean Americans were more likely to eat breakfast and Korean Americans living in non-SMSA areas to eat lunch. None of the variables examined in this study were significantly associated with frequency of dinner. These results seem to indicate that dinner is the most constant and stable meal a day. In contrast, frequency of eating-out was significantly associated with several sociodemographic variables as well as acculturation. Korean Americans were more likely to eat out if they were acculturated, unmarried, educated men with higher income.

It was notable that being married was not associated with regularity of meals or snacks. Both married and unmarried individuals appeared to engage in similar daily eating patterns, suggesting that culture and hunger structured the timing and frequency of consumption. However, the source of food differed substantially by marital status, with unmarried people much more often seeking food out of their household than those who are married. Marriage provides a commensal partner for eating occasions, and norms of marriage encourage eating at home (Bove *et al., 2003*). Many people are reluctant to or not able to prepare foods just for themselves, and this may lead many unmarried people to use commercially prepared foods and eat in restaurants or bring takeout food home.

This study was limited in making causal inference because of the cross-sectional study design. The mail survey method used limited this study to self-reported data. We used the traditional and colloquial definition of meals (breakfast, lunch, and dinner) and snacking, therefore, information from people who do not fit into the traditional meal patterns may not have been fully obtained. Since meals and snacks are defined by respondents, results may have been affected by personal bias. However, since this study asked each meal separately then combined meals into one variable, personal bias on a definition of "meals" would have been less than asking "how many meals do you eat a day?" Definition of "meals" warrants more attention because consistent use of a well-defined "meal" variable will help clarify possible relationships and mechanisms between meal frequency and body weight (Chiva, 1997; Gatenby, 1997).

This study did not examine mechanisms of the relationships between meal frequency, eating-out and body weight. One speculated mechanism on the relationship between meal frequency and body weight is that meal frequency affects energy utilization. Studies appear to indicate that there are no significant relationships between meal frequency and energy utilization, when energy intake is controlled (Bellisle *et al*., 1997). Therefore, meal frequency would not affect body weight in short terms, if isocaloric diets are consumed (Bellisle *et al*., 1997; Johnston *et al*., 2000; Taylor & Garrow, 2001). However, it is not conclusive if the same results will be found with free-living individuals where energy intake will not be controlled. Although it has been speculated that frequent meals may result in higher energy intake (Booth, 1988), issues in dietary assessment (under-and over-reporting) have hindered to reach meaningful conclusion (Bellisle *et al.*, 1997). Whether frequent meals and/or snacking lead to over consumption needs to be further studied with combination of dietary assessment and metabolic assessment.

In addition to the relationship between frequency of meal and obesity, there is growing evidence on possible advantages of frequent meals on other health conditions such as maintaining better control of blood glucose (Jenkins *et al*., 1994), although some studies (Franceschi *et al*., 1992; Gerhardsson de Verdier & Longnecker, 1992; Young & Wolf, 1990) reported that frequent meals may be related to colorectal cancer. Future research should examine relative risk and benefit of having frequent meals in order to make a recommendation to healthy and free-living population.

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