FAMILY STRUCTURE, AGE, AND GENDER AS DETERMINANTS OF ADULT HEALTH BEHAVIOR

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A family-based health survey in northern Taiwan was conducted from July 1987 to June 1989, in order to determine whether adult health behavior is associated with family structure, age category, and gender. 1,580 households (2,656 adults) were selected from 50 subwards, proportionally according to population size. Trained public health nurses from the Taiwan Provincial Health Department were assigned to administer health surveys and take physical measurements according to standardized protocols. The results can be summarized as follows: (1) Subjects in extended families had breakfast more frequently than those in nuclear families, while young subjects tended to have breakfast less frequently than older ones. (2) Male and younger subjects reported higher frequencies of sodium consumption than female and older subjects. (3) Subjects over 65 living in extended families performed physical exercise more often than their counterparts in nuclear families; males reported exercising more frequently than females. (4) Recreational activity decreased with age; among subjects over the age of 30, males reported significantly greater recreational activity than females. (5) Young subjects tended to sleep more than older ones. (6) Smoking was more prevalent among males than females. (7) Drinking was more prevalent among males than females. The study indicates that family structure plays a weak role in determination of adult health behavior; using the classifications of "nuclear" or "extended" families for household structure, no significant effect on health behavior could be detected. In order to understand the effect of family on the health behavior of individuals, additional indicators of family characteristics which may influence health behavior need to be investigated.

(Key words: *nuclear family, behavior.*)

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I. Introduction

Health behavior refers to the ways that people act, react, and function, which are related to their states of health[1]. Although links between health behavior

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and health status have long been recognized, the first conclusive study was not published until 1972 by Belloc and Breslow[2]. In this study, seven health habits were found to be significantly associated with life expectancy: eating three meals a day at regular times without snacking; breakfasting every day; sleeping adequately (seven or eight hours a night); not smoking; maintaining moderate weight; and using moderate amounts or no alcohol. The authors concluded that "certain common habits of daily life, called good health habits, are positively related to physical health status." Prospective observational studies of cancer mortality and community-based longitudinal studies of coronary heart disease mortality in Framingham, Albany, and Los Angeles[3-6] have also established evidence of a role of health behavior in determining health status. For example, high blood pressure and smoking are significant risk factors associated with the development of coronary heart disease. Therefore, pursuing better health through efforts to change individuals' health-related behavior has been suggested. However, existing health behavior and the determinants of these behavioral patterns need to be identified before intervention to change them.

A number of variables may affect patterns of health behavior. Family support has a positive effect on individual health behavior. A significant number of investigators have given sustained and systematic attention to the role of the family in recovery from illness and the ways in which the family contributes to health care[7-11]. While there has been much concern about health behaviors including drug use[12,13], auto safety[14], weight and dieting[15], coping with stress[16], smoking[17], and drinking[18] with respect to the prevention and treatment of chronic illnesses, little is known about the family as a basic until contributing to these behaviors. A recent study found that marriage and the presence of children in the home have a deterent effect on negative health behaviors, and suggested that family roles promote social control of health behaviors[19].

In fact, the family may play the most important role in determining its members' health behaviors[20,21]. Since the behavior of each family member influences the behavior of the others to varying degrees, it is crucial to identify how the family as a whole affects health behaviors. Starting with the hypothesis that interactions among people in the family depend on family structure, the present study investigates the distribution of health behaviors among adults in northern Taiwan, in order to examine the relationships of family structure, age, and gender to a variety of health behaviors.

II. Materials and Methods

1. Subjects

2000 families were selected from 50 areas in northern Taiwan using a sampling procedure proportionate to population distribution. Respondent-selection procedure, a scheme devised by Troldahl and Carter[22], was then applied. The scheme for choosing one male and one female adult (18 years of age or older) from each target family was revised by the researchers. Six versions of that scheme were randomly assigned to the questionnaires.

2. Instruments

The questionnaire consisted of two major parts, one focusing on the interrelation between health and the family, and the other focusing on the target adults' health behaviors. A panel of experts reviewed the questionnaire to establish content validity. The revised questionnaire was pretested on three communities located in the Taipei area. Afterwards, the final questionnaire was administered to collect data from the

study subjects.

3. Procedure

Permission to conduct data collection was obtained from the Department of Health of the Taiwan Provincial Government. Sixteen public health nurses served as interviewers collecting data from February 1 to March 15, 1988. They were given an introduction to and explanation of the project during their training session. The nurses were required to have mastered interviewing and measurement skills before leaving for the study destinations. In order to obtain as complete and accurate data as possible, the investigators themselves divided into four groups to supervise the field work.

III. Results

1. Participants

The final sample consisted of 1099 male adults and 1180 female adults (see Table 1 for demographic data). Age distribution of subjects from nuclear families differed markedly from that of subjects from extended families. Subjects from nuclear families tended to be younger; 57.9% were 18-39 years of age, compared to 49.8% of the subjects from extended families. Contrarily, more of the elder subjects came from extended families; 15% of subjects from extended families are over 65, compared to 5.2% of subjects from nuclear families. As the age composition of the total sample is comparable to that of the population in northern Taiwan in 1987 (18-39 years, 62.2%; 40-64 years, 30.2%; 65 and over, 7.6%), it is proper to conclude that a representative sample had been obtained. The study group was further divided according to education and marital status. As Table 1 illustrates, more subjects with no education were found in extended families than in nuclear families. Overall, most of the subjects had graduated from primary school while a few held bachelor's or master's degrees. Although most subjects were married, more subjects from extended families were unmarried or widowed than subjects from nuclear families.

2. Differences in health behaviors with respect to family structure, age, and gener

The subjects reported their health practices as follows: on average, during one week, they eat breakfast 6.0 times, consume high-sodium foods 16.4 times, exercise 1.7 times, participate in recreational activities 5.3 times, and sleep 7.9 hours. Among these subjects, 30% were current smokers and 28% current users of alcohol.

Data on seven health behaviors (breakfasting, sodium intake, exercise, recreation, sleeping, smoking, and drinking) were analyzed to investigate possible associations with age, family structure, and gender, and to examine possible interactions among these three factors. A three-way analysis of variance (ANOVA) was performed (Table 2). Subjects were classified into four age groups: young adults (18-29 years), middle-aged adults (30-39 years), older adults (40-64 years), and elderly (65 years and over). Subjects were also stratified according to family structure as members of nuclear or of extended families, with single adults living outside of family being excluded.

a) Breakfasting behavior

None of the interactions among the three factors were significant, but age and family structure did show significant effects on breakfasting behavior. The Tukey method (a multiple comparison test for two-way ANOVA) was used to analyze this data (Table 3). Subjects aged 18-29 ate breakfast significantly less often than subjects aged 40-64 or 65 and over. Similarly, subjects aged 30-39 ate breakfast significantly less often than subjects aged 65 and over.

Table 1. Distribution of demographic variables by family structure

Parameter	Nuclear Family		Extended Family		Total	
	No	%	No	%	No	%
Gender	1813	100.0	466	100.0	2279	100.0
Males	868	47.9	231	49.6	1099	48.2
Females	945	52.1	235	50.4	1180	51.8
			χ^2 = 0.426		P = 0.514	
Age	1807	100.0	458	100.0	2265	100.0
18–29	393	21.7	122	26.6	515	22.7
30–39	652	36.1	106	23.1	758	33.5
40–64	668	37.0	159	34.7	827	36.4
65 and over	94	5.2	71	15.5	165	7.3
			χ^2 = 57.934		P = 0.000***	
Education	1814	100.0	463	100.0	2277	100.0
No schooling	100	5.5	81	17.5	181	7.9
Primary school	759	41.8	157	33.9	916	40.2
Junior high	305	16.8	72	15.6	377	16.6
Senior high	438	24.1	101	21.8	539	23.7
☆College	208	11.5	52	11.2	260	11.4
☆Graduate	4	0.2	0	0.0	4	0.2
			χ^2 = 73.655		P = 0.000***	
Marital status	1800	100.0	452	100.0	2252	100.0
Single	201	11.2	71	15.7	272	12.1
Married	1561	86.7	369	81.6	1930	85.7
☆Widow/widower	28	1.6	11	2.4	39	1.7
☆Divorced	5	0.3	0	0.0	5	0.2
☆Separated	5	0.3	1	0.2	6	0.3
@Re-married	0	0.0	0	0.0	0	0.0
			χ^2 = 7.740		P = 0.021*	

☆ These groups were combined into one group when the X^2 value was calculated.
@ The group was excluded for X^2 value calculation.
* $p < 0.05$; *** $p < 0.001$.

Table 2. Analysis of variance of health behavior with respect to family structure and gender

Source of Variation	Df	Breakfasting		Sodium intake		Exercise		Recreation		Sleeping		Smoking		Drinking	
		Sum of Square	Sig F of F	Sum of Square	Sig F of F	Sum of Square	Sig F of F	Sum of Square	Sig F of F	Sum of Square	Sig F of F	Sum of Square	Sig F of F	Sum of Square	Sig F of F
Primary effects	5	213.1	10.5(.000)***	3905.7	7.2(.000)***	21879.9	27.5(.000)***	56517.6	28.7(.000)***	64.4	3.4(.004)**	161.7	234.5(.000)***	91.4	116.0(.000)***
Age Group	3	157.6	13.0(.000)***	2272.8	7.0(.000)***	19490.2	40.8(.000)***	27602.9	23.3(.000)***	45.7	4.0(.007)**	.7	1.8(.149)	4.4	9.3(.000)***
Family Structure	1	19.6	4.9(.028)*	60.8	0.6(.453)	147.4	0.9(.336)	733.3	1.9(.173)	3.3	0.9(.346)	.0	.0(.952)	.3	1.6(.200)
Gender	1	13.9	3.4(.064)	1948.7	18.0(.000)***	1566.4	9.8(.002)**	32648.5	82.8(.000)***	9.2	2.4(.119)	160.4	1163.4(.000)***	86.7	550.9(.000)***
2-Way Interactions:	7	14.1	0.5(.837)	482.0	0.6(.726)	3986.1	3.6(.001)**	5416.6	2.0(.057)	12.79	0.5(.846)	2.2	2.3(.026)*	3.0	2.7(.008)**
Age x Family Structure	3	7.3	0.6(.615)	129.5	0.4(.754)	1727.4	3.6(.013)*	354.4	0.3(.826)	2.98	0.3(.852)	.3	.8(.484)	.0	.1(.969)
Age x Gender	3	5.8	0.5(.699)	279.4	0.9(.461)	2424.5	5.1(.002)**	5163.0	4.4(.005)**	7.55	0.7(.572)	1.8	4.3(.005)**	2.0	4.3(.005)**
Gender x Family Structure	1	1.8	0.4(.507)	65.9	0.6(.435)	562.0	3.5(.060)	35.0	0.1(.766)	2.26	0.7(.439)	.0	.2(.660)	.4	2.7(.099)
3-Way Interaction:	3	4.0	0.3(.803)	251.3	0.8(.508)	541.0	1.1(.335)	2322.6	2.0(.118)	2.50	0.2(.882)	.0	.1(.961)	.2	.4(.743)
Age x Gender x Family Structure	3	4.0	0.3(.803)	251.3	0.8(.508)	541.0	1.1(.335)	2322.6	2.0(.118)	2.50	0.2(.882)	.0	.1(.961)	.2	.4(.743)

* $P < 0.05$. ; ** $P < 0.01$. ; *** $P < 0.001$.

Table 3. Tukey test on breakfasting and sodium intake behaviors with respect to age group, family structure and gener

Item	Age group				Total	
	18–29	30–39	40–64	65 and over		
	Breakfasting (number of times/week)					
Family structure:						
Nuclear family	5.67	5.79	6.21	6.52	5.97	q = –3.54
Extended family	5.70	6.19	6.53	6.61	6.26	
Total	5.68	5.85	6.27	6.55	6.03	
				q = –6.04		
		q = –5.09				
	q = –7.51					
	High sodium intake (number of times/week)					
Gener:						
Male	18.54	18.62	16.19	14.91	17.26	q = –4.55
Female	16.08	16.00	15.13	13.62	15.55	
Total	17.06	17.20	15.70	14.30	16.37	
				q = 5.46		
	q = 5.19					

└─┘ : Indicates that the difference between the two groups is significant when the Tukey test is applied.

Furthermore, subjects from extended families ate breakfast more frequently than subjects from nuclear families. These findings indicate that age and family structure individually affect breakfasting behavior.

b) Sodium intake behavior

Significant differences in sodium intake (sum of frequencies of five forms of sodium intake: addition of salt or soy sauce to food at the table; consumption of seasonings containing sodium; consumption of food processed with salt; consumption of fast foods; and eating out) were found between age groups and between sexes. The Tukey test indicated significant differences between males and females, between subjects 18-29 years old and subjects 65 and over, and between subjects 30-39 years old and subjects 65 and over (Table 3). It can be concluded that for these subjects, the frequency of sodium intake decreases with age.

c) Exercise behavior

A total exercise score was computed by summing the frequencies with which subjects performed eight types of exercise (walking, jogging, hiking, dancing, Chinese boxing, ball-playing, skating, and swimming). An F value of 3.6 was found for the interaction between age group and family structure, while an F value of 5.1 was found for the interaction between age group and gender (Table 2). References to age group and gender as independent determinants of exercise behavior are therefore not meaningful.

Figure 1 plots mean frequency of exercising against age group and family structure. Subjects in the oldest age group from either nuclear or extended families showed the highest frequencies of exercising, while subjects aged 30-39 showed the lowest frequencies. It is of interest that while subjects under 65 in extended families reported lower frequencies than corresponding subjects in nuclear families, this rank order is inverted in subjects aged 65 and over. The simple effects test used for post hoc comparison indicated that significant differences exist between the frequencies of performing exercise reported by subjects aged 65 and over from nuclear families and the frequencies

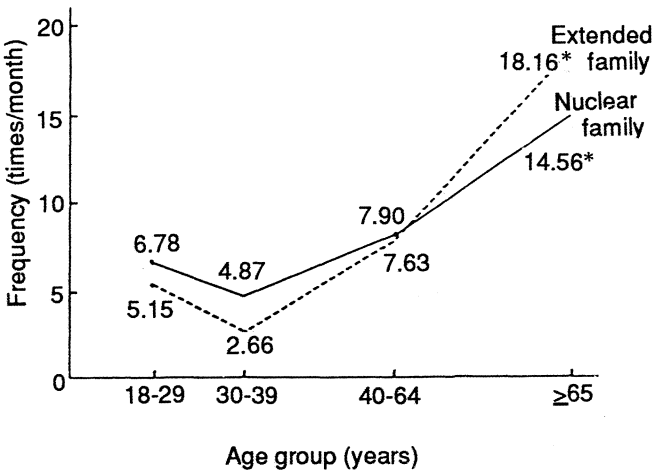

Figure 1. Total frequency of performing eight types of exercise with respect to age group and family structure.
* F = 6.11.

reported by those from extended families, and that for subjects from both nuclear and extended families, the frequency of performing exercise varies significantly with age group (F values are 16.74 and 43.83 respectively).

Figure 2 depicts the interaction between age group and gender with respect to exercise. An interaction is suggested since the line segments are not paralle. Males 65 and over reported the highest mean frequency of exercise, while males 30-39 years old reported the lowest. The simple effects test clearly demonstrates that there is a significant difference in frequency of exercise between males and females 65 and over, and the frequency of exercise stratified by gender varies significantly among the four age groups (F values are 47.00 and 16.45, respectively).

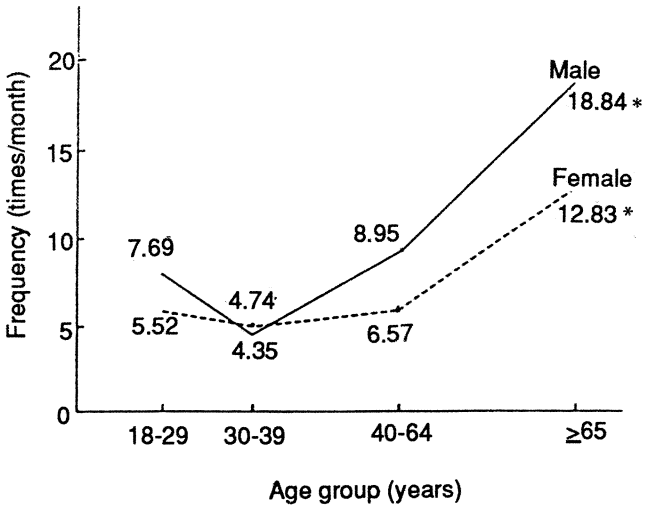

Figure 2. Total frequency of performing eight types of exercise with respect to age group and gender.
* F = 21.86.

d) Recreation behavior

Total frequencies with which subjects participated in eight types of recreation (reading, chess-playing, music-playing, drawing or sculpting, religious assemblies, gardening, conversation, and artistic entertainment) were calculated. The F values on recreation indicate an interaction between age group and gender (Table 2).

Figure 3 depicts an ordinal interaction, i.e., the rank order of the frequencies remains constant. Males showed consistently higher frequencies of recreation than females, but the differences between the sexes varied depending upon age group. While the frequencies of participating in recreation decrease with age, the difference in the frequencies between sexes increases with age. The simple effects test demonstrated that in the 30-39, 40-64, and 65 and over age groups, there are significant differences between the participation frequencies of males and females, and that for both sexes, the participation frequencies decrease significantly with age (F values are 7.20 for males and 24.41 for females).

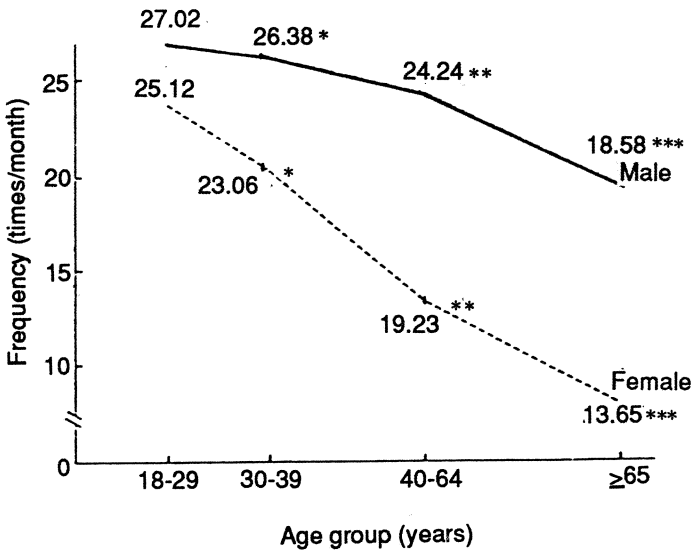

Figure 3. Total frequency of participating in eight types of recreation with respect to age group and gender.
* F = 9.09. ; ** F = 28.60 ; *** F = 26.99

e) Sleeping behavior

Data on time spent sleeping, analyzed by ANOVA (Table 2), displayed no significant interactions among the three factors. Furthermore, significant differences in sleeping behavior were found only when subjects were stratified by age group. A post hoc comparison performed using the Scheffe procedure indicated significant differences between the 18-29 age group and 40-64 age group (F = 27.73), the 18-29 age group and the 65 and over group (F = 10.45), the 30-39 age group and the 40-64 age group (F = 29.59), and the 30-39 age group and the 65 and over group (F = 8.80).

f) Smoking behavior

ANOVA revealed a significant interaction between age group and gender (Table 2). Figure 4 illustrates the prevalence rates of current smoking behavior for different age groups and sexes. Smoking is most prevalent in males aged 30-39, and least prevalent in females under 65. Overall, the differences between males and females are great. The simple effects test indicated that in all age groups, smoking prevalence is significantly higher among males than females (F values are 210.74, 242.51, 188.38, and 105.96 corresponding to age groups), and that for both sexes, smoking prevalence varies significantly depending on age (F = 6.44 for males, 13.93 for females).

g) Drinking behavior

Prevalence rates of current drinking behavior displayed patterns similar to those of smoking behavior. An interaction between age group and gender is suggested by an F value of 4.3 (Table 2). As shown in Figure 5, the highest overall drinking prevalences

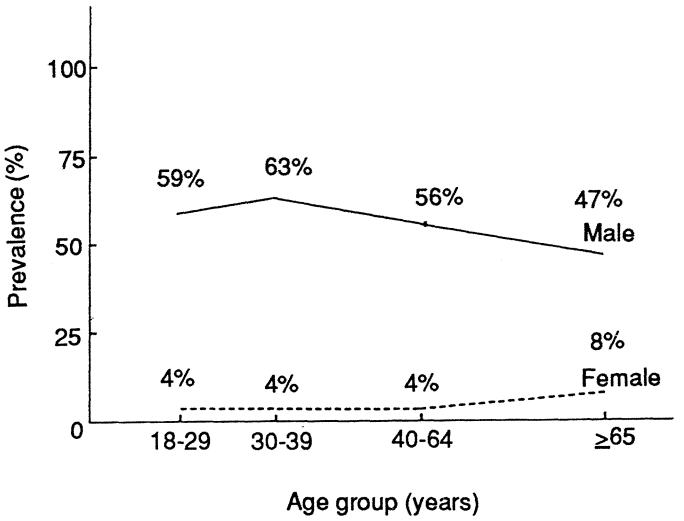

Figure 4. Prevalence of smoking with respect to age group and gender.

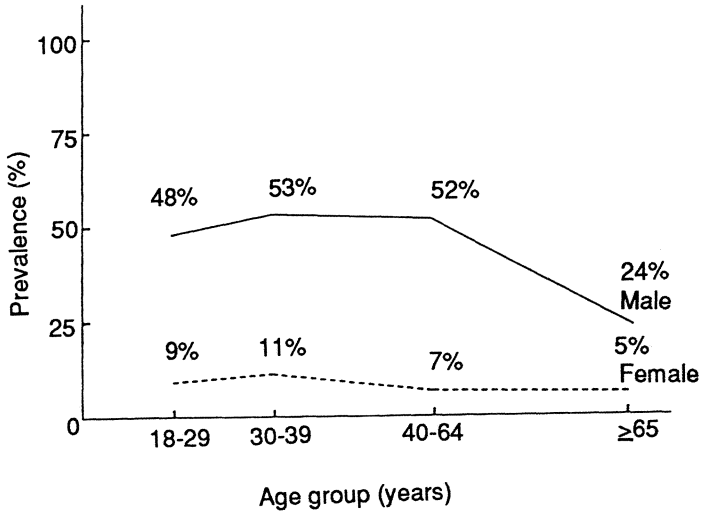

Figure 5. Prevalence of drinking with respect to age group and gender.

were reported by both males and females in the 30-39 age group. Drinking prevalence decreased with age for subjects over 40 years old. The simple effects test indicated results similar to those for smoking: in all age groups, drinking prevalence is significantly greater in males than females (F values are 91.04, 105.59, 121.21, and 21.61 corresponding to age groups), and for both males and females, drinking prevalence varies significantly depending on age (F = 42.74 for males and 22.38 for females).

3. The effects of family structure, age, and gender on health behaviors

The above analyses reveal that only two of the seven health behaviors, breakfasting and exercise, are affected by the variable of family structure. Multiple classification analysis was used to discern the magnitude of effects of each family structure, resulting in deviations of –0.05 for nuclear family structure and 0.19 for extended family structure (adjusted to compensate for distortion from age and gender). An eta value of 0.06 for the factor of family structure indicated that about 0.36% of the variance in breakfasting behavior is attributed to family structure. Meanwhile, the standardized regression coefficients were 0.05 for family structure, 0.13 for age group, and 0.04 for gender. These findings suggested that family structure plays a weak role in determining breakfasting behavior. Family structure similarly plays a weak role in determining exercise behavior (eta = 0.02, beta = 0.02). The data thus failed to prove any strong association between family structure and any of the seven health behaviors.

The two factors of age and gender showed stronger associations with health behavior than family structure. For example, the beta values of age group are 0.13 for breakfasting, 0.10 for sodium intake, 0.23 for exercise, 0.17 for recreation, and 0.10 for drinking. Beta values of gender are 0.19 for recreation, 0.59 for smoking, and 0.45 for drinking.

IV. Discussion

A family-based health survey collected information on adult health behavior in northern Taiwan. When compared to standards for desirable health behaviors previously mentioned[2], it is apparent that a behavioral intervention program is needed to enhance adult practice of exercise, restriction of sodium intake, and abstention from smoking and drinking.

The data analyzed by age group and gender indicated that both males and females aged 30-39 years exercise the least (1.1 times/week for males, 1.2 times/week for females). In addition, males aged 30-39 reported the highest proportions of current smokers (63%) and current drinkers (53%). Since these subjects are often busy with their occupations and frequently neglect their health, it becomes more urgent to provide to this group a program to promote healthy lifestyles.

Although family has long been viewed as "the basic system in which health behavior and care are organized, preformed, and secured"[23], the great changes in family functions following modernization lead to a society replete with variety and freedom[24]. Sociologists have concluded that the structure and function of the family has changed following modern social transitions in Taiwan[25,26]. In this study, the family is defined as a "domestic unit" or "household." The function of the family, especially the impact of the family on members' health behavior, could not be positively proven by examination of the variable of family structure. We should therefore pay more attention to the indicator of family structure in family-based research. Furthermore, we need to recognize the associations of family, age, and gender with various behaviors before developing behavioral modification programs.

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家庭結構，年齡和性別影響成人健康行爲之探討

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一個以『家庭』爲基礎的健康調查，自民國 76 年 7 月迄民國 77 年 6 月止，共完訪 1,580 個家戶和 2,656 位 18 歲以上成人。據本家戶係按人口比例以系統集束抽樣步驟，從台灣北部地區選出，共計 50 個村里。經臺灣省政府衞生處支援，調派 16 位訓練有素的公共衞生護士，於接受爲期三天的訓練後，每二人編成一組分別前往預定地點進行家戶訪視工作。

本研究目的在探討成人的健康行爲和家庭結構，年齡組，及性別等變項之間的關聯性。重要結果歸納如下：(1)調查對象屬擴大家庭者比核心家庭者吃早餐的頻率高，而且年長者比年輕者吃早餐的頻率高；(2)男性比女性攝取高鈉食物的頻率高，而且年輕者比年長者的攝取鈉的頻率也高；(3)就 65 歲以上的調查對象而言，屬擴大家庭者較核心家庭者從事運動的頻率高，同時男性所報告的運動頻率也比女性高；(4)從事休閒活動的頻率隨年齡的增長而遞減，30 歲以上的調查對象中，男性的參與頻率顯著高於女性；(5)年輕者比年長者的睡眠時間長；(6)男性比女性目前有抽菸的比率高；(7)男性目前有喝酒的比率較女性爲高。

『家庭結構』變項對於成人健康行爲的影響力在本研究中發現甚微，與預期結果相去甚遠。若按『成員組成』將家庭分成『擴大家庭』或『核心家庭』的類別時，家庭功能（如家人支持）無法有效地被偵測出來。欲瞭解家庭對成員的健康行爲是否具有影響力，需對反應家庭功能的指標（建議利用『家庭關懷』指數）再做探討。整體來說，成人健康行爲中需加强的項目爲規律地運動，減少高鈉食物的攝取，除去抽菸和喝酒的習慣。

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