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Comparing Disparities in the Health-promoting Lifestyles of Taiwanese Workers in Various Occupations

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Abstract: In Taiwan, workplace health promotion programs have been designed on an organizational basis, and the specific health needs for workers within different occupational categories have not usually been taken into account. This study describes the various levels of overall health-promoting lifestyles and health-promoting behaviors of workers within different occupational categories, and examines the effects of occupational category, perceived busyness, and BMI level on overall health-promoting lifestyles and health-promoting behaviors. A cross-sectional survey with convenient sampling, comprising a self-reporting questionnaire (which included the Chinese version of the Health-Promoting Lifestyle Profile), was used to measure the overall HPLP and six health-promoting behaviors (nutrition, health responsibility, self-actualization, interpersonal support, exercise, and stress management). A total of 796 participants were recruited. Multiple regression analysis showed that the various occupational categories sustained significant differences in overall HPLP, nutrition, self-actualization, interpersonal support, and stress management (after controlling for some specific factors). Perceived busyness showed positive effects on the overall HPLP, self-actualization, interpersonal support, and stress management. The obese group had less participation in overall health-promoting lifestyles and stress management when compared with the moderate BMI group. Workplace health promotion practitioners should therefore develop specific strategies to target the laborers and workers who demonstrate obesity.

Key words: Health-promoting lifestyle, Workplace health promotion, Occupation, Perceived busyness, Body mass index

Introduction

Since the 1970s, the issue of health promotion has drawn the attention of public health professionals. In the mid-1970s, Lalonde (the Canadian Minister of National Health and Welfare) categorized a new concept called *the health field*, which included human biology, the environment, lifestyle, and healthcare organizations[1)]. He also emphasized the role of the individuals in building a healthy lifestyle for themselves and in improving their health. In 1978, the Declaration of Alma-Ata identified "the need for urgent action by all governments, all health and development workers, and the world community to protect and promote the health of all the people of the world[2)]". Following this declaration, various health promotion activities were implemented throughout the world, with the goal of changing the unhealthy lifestyles of work-

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ers. In Taiwan, workplace health promotion programs were launched from the 1990s. In the initial stages, the Bureau of Health Promotion and the Council of Labor Affairs collaboratively held workshops to introduce the concept and procedures of workplace health promotion to factory nurses and occupational safety personnel[3]. Only a few corporations implemented these workplace health promotion programs however, and their programs were focused mainly on the prevention of chronic diseases[4] or on improving the physical fitness of workers[5]. Even for such limited outcomes, however, these programs did not prove to be effective, as most corporations merely distributed health education brochures or delivered health education lectures to large groups[6]. Therefore, since 2001, the government has provided funding to set up six Workplace Hygiene and Healthcare Centers to carry out health promotion programs[7]. From this initiative, a number of more relevant activities have been gradually developed.

Helping workers to have a healthy lifestyle is one of the goals of workplace health promotion[8]. All aspects of the workplace health promotion programs (describing the problem, designing programs, participating, and changing behaviors) are important toward achieving the goal of developing and maintaining a healthy lifestyle. An understanding of the existing health-promoting lifestyles of workers would be a beneficial to health promotion practitioners when designing programs. Pender[9] has discriminated health-promoting behaviors from health-protecting behaviors to clarify the different meanings of the various health-related behaviors. Health-protecting behavior is performed in order to decrease the individual's probability of encountering illness or diseases; whereas health-promoting behavior is directed toward sustaining or enhancing the individual's level of well-being and self-actualization. Walker *et al.*[10] have further defined a health-promoting lifestyle as "a multidimensional pattern of self-initiated actions and perceptions that serve to maintain or enhance the level of wellness, self-actualization and fulfillment of the individual". This concept extends beyond the meaning of disease prevention, and is well suited to the goals of workplace health promotion. The present study has adopted Walker's definition, and uses the Health-Promoting Lifestyle Profile (HPLP), which was developed by Walker *et al.*[10] to determine an overall health-promoting lifestyle score (overall HPLP) and to quantify six subscales of nutrition, health responsibility, self-actualization, interpersonal support, exercise, and stress management.

The roles of gender and age difference in relation to the HPLP have been examined in many existing studies. Some studies have supported the conclusion that females have had more positive participation in overall health-promoting lifestyles or in some heath-promoting behaviors[11, 12]. However, other studies did not support the conclusion that females have higher proficiency than males in the overall HPLP[13, 14]. Previous studies have found that the effect of age on health-promoting behaviors is not consistent[12, 14, 15]. Weitzel and Waller[16] have indicated that age significantly adds to the prediction of health-promoting behaviors for blue-collar workers, but have noted that these effects vary depending on ethnicity. These inconsistent findings mentioned above might result from variations in the presentation of the samples, cultures, age classifications, and ethnic groups.

Some previous studies have shown a positive relationship between marriage and the overall HPLP[17], although other studies have not supported these findings[12, 14]. Arguably, marital status will reflect the form and routine of family life, however in Taiwanese society, the situation of living with family is more commonly representative of family life than marital status. Many unmarried Taiwanese people prefer to live with their families, and some married people have to leave home because of work. Therefore, the present study analyzes whether living with a family (rather than marital status) has an effect on the health-promoting behaviors of participants. In addition, previous studies have consistently found that perceived health status is one of the significant determinants of the overall HPLP[11, 18]. Perceived health status is subjective rather than objective, and is regarded as one of cognitive factors for the HPLP[9]. Therefore, for a better understanding of workers' self-initiated participation in health-promoting lifestyles, their perceived health statuses are taken into consideration in this study.

Employment is related to lifestyle: occupation not only determines the content of work, but also has the required educational level, socioeconomic status, and ways of living. Although some studies have used the HPLP to assess the health-promoting behaviors of workers[11, 14, 15], the comparisons between different occupational categories on health-promoting behaviors have seldom been explored. In Taiwan, workplace health promotion programs are usually designed on an organizational basis, and as such the specific health needs of workers with different occupational categories within an organization have been neglected. Therefore, clarification of the effect of occupational category on the overall HPLP and health-promoting behaviors is particularly important to this research.

This research is also concerned with two additional factors that are related to the daily lives of workers: perceived busyness in daily life, and Body Mass Index (BMI). People often report that they are busy and therefore do not have enough time to practice health-promoting behaviors in modern life, and previous studies have found that being busy can be seen as a barrier to prac-

ticing health-promoting behaviors[19, 20]. However, the relationship between the levels of perceived busyness in daily life and the practice of health-promoting behaviors has seldom been examined. In addition, the BMI is used as an indicator of obesity and malnutrition. It is calculated by statistical measure from the individual's weight and height, and bodyweight can, to a certain extent, be related to lifestyle. The BMI level is an easily recognized variable for workplace health promotion practitioners to use while they design intervention programs. And although a large number of studies on the BMI level and the HPLP have been carried out separately, few studies have focused on the association between BMI level and the HPLP[21]. With BMI being considered, significant findings from this study would allow health promotion practitioners to develop new programs or to expand existing interventions for workers with obesity.

The aims of this study are therefore: 1) to describe the levels of the overall HPLP and health-promoting behaviors of workers within different occupational categories; 2) to examine the effect of occupational category on the overall HPLP and health-promoting behaviors, after controlling for potentially related factors (gender, age, whether living with family, and perceived health status); and 3) to examine the effects of both perceived busyness in daily life and the BMI level on the overall HPLP and health-promoting behaviors, after controlling for potentially related factors.

Materials and Methods

Study design

The investigation was conducted in 2008, and adopted a cross-sectional research method with convenient sampling. A self-reporting questionnaire was distributed to 916 full-time workers from 20 companies in central Taiwan. These companies comprised 6,219 workers in total. The companies were chosen to represent various industries and a variety of occupations. The participating companies were chosen on the basis that they each had a good relationship with the government funded *Workplace Hygiene and Healthcare Center* in central Taiwan. This allowed the study to proceed without difficulty, also the factory nurses and occupational safety personnel working in these companies were willing to be trained to distribute and collect the survey questionnaires. Before the questionnaires were distributed, an announcement was made to workers requesting their voluntary participation. Potential participants were advised that they would be required to fill in the questionnaire anonymously and to contribute their valuable information to worksite health promotion planning.

Survey instrument

There were two parts in the questionnaire: personal information and the Chinese version of the Health-Promoting Lifestyle Profile (HPLP-C)[22]. Personal information included age, gender, education level, marital status, whether living with family or not, perceived health status, height, body weight, occupation, work shifts, and the level of perceived busyness in daily life. Perceived health status was measured by a single question ("How would you rate your overall physical health at the present time?"), using a five-point Likert response format ranging from "very poor" to "excellent". A previous study has shown that use of a single question can be both reliable and validated[23].

Occupations included manager, professional, technician, craft worker, machine operator, office worker, and service worker (according to the categorization system of the Directorate-General of Accounting, Budget, and Statistics of the Executive Yuan)[24]. For statistical purposes, occupations were divided into four categories: skilled professional (including manager, professional, and technician), laborer (including craft worker and machine operator), office worker, and service worker. Variables for work shifts were "regular day shifts", "regular night shifts", and "rotating shifts". The level of perceived busyness in daily life was measured by the question of "How often do you feel that you are leading a busy lifestyle?". To answer this, a four-point Likert scale was adopted, with the options of "never", "sometimes", "often", and "routinely". Body weight and height were transformed into the BMI (kg/m^2). Four groups were identified (as outlined by the Department of Health, Executive Yuan, Taiwan): underweight (BMI<18.5), moderate (18.5≤BMI<24.0), overweight (24.0≤BMI<27.0), and obese (BMI≥27.0)[25].

The HPLP-C is a validated instrument which has been translated and edited from the HPLP that was originally developed by Walker *et al.*[10] to assess health-promoting behaviors. The HPLP-C uses a four-point Likert scale, ranging from 1 ("never") to 4 ("routinely"). Higher scores indicate greater participation in health-promoting behaviors. Seven scores can be obtained: these are the overall HPLP and the six subscales of nutrition, health responsibility, self-actualization, interpersonal support, exercise, and stress management. For this study, alpha reliability was 0.94 for the total scale and 0.78 to 0.92 for the subscales.

Statistical methods

The *SPSS*-13.0 software for Microsoft Windows was used for statistical analysis. The personal characteristics of the participants, and their health-promoting behaviors, were summarized using descriptive statistics. χ^2 test and

F-test were adopted to examine the associations of personal information by occupational category. The contrasts of occupational category on the overall HPLP and health-promoting behaviors were tested through ANOVA with Scheffe's post-hoc comparison. Multiple regression analysis was adopted to examine the effects of occupational category, perceived busyness, and the BMI level on the overall HPLP and health-promoting behaviors (with controlling for gender, age, whether living with family or not, and perceived health status). Dummy variables were established for gender (with "male" as reference), for living with family (with "no" as reference), for BMI (with "moderate" as reference), and for occupational category (with "laborer" as reference).

Results

A total of 916 questionnaires were distributed, of which 796 questionnaires were successful collected: the response rate was 86.9%. The personal characteristics of the participants and the associations of personal characteristics by four occupational categories are listed in Table 1. Among all the participants, the percentage of males was 54.7% and females 45.3%. The ages ranged from 18 to 61, and the average age was 32.7 ± 8.0. The educational background for the majority of the participants was that of a college or university graduate (67.6%), and this was followed by high school or vocational high school graduate (25.7%). Close to half of the participants (52.3%) were married. The majority of the participants (81.0%) were living with family. More than half of participants (51.4%) perceived themselves as having an ordinary health status. Just under half (46.2%) of the participants were skilled professionals. The majority (82.1%) worked on the day shift. Over 40% of participants often or routinely felt busy in their daily lives. The BMI levels indicated that 58.3% were within a moderate level. The occupational category showed significant associations with gender, age, educational level, marital status, work shift ($p<0.001$) and the BMI level ($p<0.01$).

For all workers, the mean score of the overall HPLP was 2.47 (SD=0.41) (Table 2). Among the six health-promoting behaviors, the mean score of nutrition was the highest (M=2.88, SD=0.57), interpersonal support came next (M=2.81, SD=0.59) followed by self-actualization (M=2.69, SD=0.59) and stress management (M=2.55, SD=0.51). Participation in exercise (M=1.94, SD=0.63) and health responsibility (M=1.92, SD=0.52) had the lowest scores.

The occupational category showed significant differences in the overall HPLP and all health-promoting behaviors (except for health responsibility) when analyzed using ANOVA with Scheffe's post-hoc comparison (Table 2). For nutrition, the category of office worker had higher scores than that of laborer ($p<0.05$). For self-actualization, professional, office worker, and service worker categories all had higher scores than laborer ($p<0.05$). For interpersonal support, the office worker and service worker categories indicated higher scores than did laborer ($p<0.05$). For exercise, the service worker category had higher scores than did professional ($p<0.05$). For stress management, the office worker category had higher scores than laborer ($p<0.05$). In the overall HPLP, office worker and service worker categories had higher scores than laborer ($p<0.05$).

Variations in occupational category indicated significant differences in the overall HPLP, nutrition, self-actualization, interpersonal support, and stress management in multiple regression with controlling for gender, age, living with family, and perceived health status ($p<0.05$) (Table 3). Office worker and service worker categories had higher scores than laborer in the overall HPLP. Professional and office worker categories had higher scores for nutrition than laborer. Professional, office worker, and service worker categories all had higher scores than laborer for self-actualization. The service worker category had higher scores than laborer for interpersonal support and stress management. The level of perceived busyness showed significant effects on the overall HPLP, self-actualization, interpersonal support, and stress management ($p<0.001$). The obese group had significant lower scores in the overall HPLP and stress management than the group within the moderate BMI range ($p<0.001$).

Discussion

This study aimed to explore the various levels of overall health-promoting lifestyles and health-promoting behaviors of Taiwanese workers within different occupational categories, and to examine the effects of occupational category, perceived busyness in daily life, and the BMI level on health-promoting behaviors and the overall HPLP. Previous studies using the HPLP have mainly collected data from workers of only a single company (or a small number of companies that represent only one or a few industries)[12, 13, 16]. To redress this, the present study recruited 796 participants from 20 companies and covered four occupational categories. This allowed the research to survey the health-promoting lifestyles of workers more comprehensively as a basis for further strategic planning of workplace health promotion.

The mean score of the overall HPLP for all participants was 2.47, and the mean frequency was between "sometimes" and "often". In general, the engagement of Taiwanese workers in health-promoting lifestyles still

Table 1. Personal characteristics of all participants and associations of personal characteristics by occupational category

Variables	All workers (n=796) n (%)[a]	Occupational category: Professional (n=367, 46.2%) n (%)	Laborer (n=152, 19.1%) n (%)	Office worker (n=184, 23.1%) n (%)	Service worker (n=92, 11.6%) n (%)	χ^2
Gender (n=786)						66.88 ***
Male	430 (54.7)	227 (62.2)	95 (63.3)	51 (28.2)	57 (63.3)	
Female	356 (45.3)	138 (37.8)	55 (36.7)	130 (71.8)	33 (36.7)	
Educational level (n=787)						163.78 ***
Secondary or less	25 (3.2)	4 (1.1)	14 (9.3)	1 (0.6)	6 (6.6)	
High school	202 (25.7)	61 (16.8)	83 (55.0)	26 (14.4)	32 (35.2)	
Undergraduate	532 (67.6)	273 (75.0)	53 (35.1)	153 (84.5)	53 (58.2)	
Postgraduate	28 (3.6)	26 (7.1)	1 (0.7)	1 (0.6)	0 (0.0)	
Marital status (n=763)						26.72 ***
Married	399 (52.3)	192 (53.3)	85 (62.0)	97 (54.8)	25 (28.1)	
Not currently married	364 (47.7)	168 (46.7)	52 (38.0)	80 (45.2)	64 (71.9)	
Living with family (n=775)						6.57
Yes	628 (81.0)	287 (78.8)	129 (88.4)	138 (79.3)	74 (81.3)	
No	147 (19.0)	77 (21.2)	17 (11.6)	36 (20.7)	17 (18.7)	
Perceived health status (n=751)						12.51
Good or excellent	304 (40.5)	148 (42.0)	48 (35.6)	62 (35.2)	46 (52.3)	
Ordinary	386 (51.4)	174 (49.4)	79 (58.5)	100 (56.8)	33 (37.5)	
Poor or very poor	61 (8.1)	30 (8.5)	8 (5.9)	14 (8.0)	9 (10.2)	
Work shifts (n=784)						137.61 ***
Day shift	644 (82.1)	314 (86.7)	106 (72.1)	180 (97.8)	44 (48.4)	
Night shift	19 (2.4)	6 (1.7)	9 (6.1)	3 (1.6)	1 (1.1)	
Rotating shift	121 (15.4)	42 (11.6)	32 (21.8)	1 (0.5)	46 (50.5)	
Perceived busyness (n=529)						7.31
Never	35 (6.6)	13 (4.8)	8 (10.0)	6 (6.1)	8 (10.3)	
Sometimes	270 (51.0)	146 (53.7)	39 (48.8)	50 (50.5)	35 (44.9)	
Often	168 (31.8)	87 (32.0)	25 (31.3)	29 (29.3)	27 (34.6)	
Routinely	56 (10.6)	26 (9.6)	8 (10.0)	14 (14.1)	8 (10.3)	
BMI (n=727)						28.24 **
Underweight	60 (8.3)	26 (7.7)	12 (8.5)	16 (9.9)	6 (7.0)	
Moderate	424 (58.3)	186 (55.0)	74 (52.1)	116 (72.0)	48 (55.8)	
Overweight	162 (22.3)	89 (26.3)	31 (21.8)	22 (13.7)	20 (23.3)	
Obese	81 (11.1)	37 (10.9)	25 (17.6)	7 (4.3)	12 (14.0)	
			Mean ± SD			F
Age, year (n=742)	32.7 ± 8.0	32.4 ± 7.0	32.4 ± 7.8	34.7 ± 8.3	32.7 ± 8.0	6.53 ***

[a]The percentage in this table is calculated according to valid percentage.
*p<0.05, **p<0.01, ***p<0.001 calculated using χ^2 or F-test.

needs to be enhanced. In Taiwan, the interventions that are based on physical activity and nutrition are frequently carried out within workplace health promotion programs[26]. The present study has found that nutrition scored as the highest, whereas exercise was ranked as the fifth for all workers. A previous study has also shown that 51% of Taiwanese workers in 2007 did not have an exercise routine, which means the frequency of their exercise activities was less than 3 times in a week[27]. The effectiveness of workplace health promotion programs on physical activity should therefore be of primary concern.

In an integrative review[18], the author has found that the most frequently studied variables may not be the best predictors of a health-promoting lifestyle. Even at the maximum level, prior behavioral factors, perceived self-efficacy, health locus of control, health value, importance

Table 2. Rank of health-promoting behaviors among all workers and the comparisons of occupational categories on health-promoting behaviors

			Occupational category					
	All workers		Professional	Laborer	Office worker	Service worker		
Health behavior	Mean (SD)	Rank	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*F*	Scheffe's post-hoc comparison[#]
Nutrition	2.88 (0.57)	1	2.91 (0.58)	2.78 (0.58)	2.96 (0.53)	2.77 (0.58)	4.30 **	O>L
Health responsibility	1.92 (0.52)	6	1.91 (0.51)	1.87 (0.55)	1.93 (0.51)	2.01 (0.51)	1.37	
Self-actualization	2.69 (0.59)	3	2.73 (0.55)	2.53 (0.64)	2.73 (0.58)	2.77 (0.65)	5.26 **	P>L, O>L, S>L
Interpersonal support	2.81 (0.59)	2	2.77 (0.57)	2.71 (0.62)	2.90 (0.57)	2.94 (0.59)	4.89 **	O>L, S>L
Exercise	1.94 (0.63)	5	1.89 (0.60)	1.95 (0.66)	1.93 (0.64)	2.10 (0.67)	2.78 *	S>P
Stress management	2.55 (0.51)	4	2.55 (0.50)	2.45 (0.53)	2.61 (0.48)	2.59 (0.55)	3.02 *	O>L
Overall HPLP	2.47 (0.41)		2.47 (0.40)	2.38 (0.44)	2.52 (0.40)	2.54 (0.43)	4.01 **	O>L, S>L

*p<0.05, **p<0.01, ***p<0.001 calculated using ANOVA.
[#]P: Professional, L: Laborer, O: Office worker, S: Service worker.

Table 3. Multiple regression for health-promoting behaviors

Variables	Overall HPLP β	Nutrition β	Health responsibility β	Self-actualization β	Interpersonal support β	Exercise β	Stress management β
Gender (female/male)	–0.04	0.01	0.07	–0.06	–0.07	–0.17 **	–0.00
Age (yr)	0.14 **	0.16 **	0.22 ***	0.11 *	0.06	–0.06	0.11 *
Living with family (yes/no)	0.13 **	0.19 ***	0.09	0.08	0.09 *	0.04	0.11 *
Perceived health status	0.26 ***	0.11 *	0.21 ***	0.25 ***	0.14 **	0.25 ***	0.19 ***
Occupational category[a]							
Professional	0.10	0.13 *	0.02	0.14 *	0.02	–0.04	0.11
Office worker	0.12 *	0.15 *	–0.01	0.15 *	0.12	0.08	0.08
Service worker	0.14 *	0.05	0.09	0.11 *	0.13 *	0.10	0.13 *
Perceived busyness	0.19 ***	0.02	0.08	0.22 ***	0.25 ***	0.05	0.17 ***
BMI[b]							
Underweight	–0.04	–0.05	–0.05	–0.02	–0.03	–0.04	0.00
Overweight	0.01	0.01	–0.03	0.02	0.01	0.06	–0.01
Obese	–0.10 *	–0.00	–0.06	–0.09	–0.08	–0.01	–0.15 **
Adjusted R^2	0.154	0.070	0.101	0.140	0.102	0.101	0.102

β denotes standardized regression coefficient.
[a]Laborer as a reference category. Exclusive of missing data, 529 workers were into the regressions: 272 professionals, 99 office workers, 78 service workers, and 80 laborers (51.4%, 18.7%, 14.7%, and 15.1%, respectively).
[b]Moderate level of BMI as a reference group.
*p<0.05, **p<0.01, ***p<0.001.

of health, health status, and definition of health together explained only 31% of the variance in the overall HPLP among workers[11]. It has been suggested that, in order to better understand the phenomenon of a health-promoting lifestyle, additional variables should be examined. For this reason, this study aimed to investigate other potential factors that are also widely recognizable and accessible for occupational safety personnel. Occupational category, BMI level, and perceived busyness have enhanced our understanding about possible predictors of health-promoting behaviors among Taiwanese workers, although the chosen variables did not account much for the variance in our dependent variable (the adjusted R^2 of multiple regressions were between 0.07 and 0.15).

The findings of this research have indicated that the occupational category produces significant differences on the overall HPLP and on some health-promoting behaviors (Tables 2 and 3). Occupational category should therefore be taken into account when designing workplace health promotion programs. Previous studies using the HPLP have focused on specific demographic groups[15, 28] or on a small number of occupations[29, 30], and the influence of occupational category has been relatively neglected. In this study, laborers scored lower in the overall

HPLP, nutrition, self-actualization, interpersonal support, and stress management than other occupational categories. Lusk *et al.*[12] have also found that blue-collar workers had lower scores in the overall HPLP, nutrition, self-actualization, interpersonal support, and exercise than skilled-trade and white-collar workers. Blue-collar workers obviously have the greatest need for assistance toward enhancing their health awareness. Gillis[18] has integrated many relevant studies and found that self-efficacy and positive health concepts were strongly associated with practice in health-promoting behaviors. Therefore, educating workers (particularly laborers) to regard health as *wellness*, rather than merely the absence of illness, would be beneficial for developing and maintaining healthy lifestyles. In terms of self-actualization, labor workers scored significantly lower than all other occupational categories. As other researchers have speculated, low scores of labor workers on health-promoting lifestyles might reflect a lack of their familiarity with the concepts measured in the HPLP[12]. More investigations are needed to further explore this possibility.

The high percentage of perceived busyness ("often" or "routinely") indicates that perceived busyness is characteristic of everyday life for Taiwanese workers, regardless of occupational category (Table 1). However, there were only a limited number of existing studies that have examined the relationship between busyness and health-promoting behaviors. Among some of these, busyness has been regarded as an internal barrier to engaging in more exercise[19, 20]. Surprisingly, in the present study, the level of perceived busyness had positive effects on the overall HPLP, self-actualization, interpersonal support, and stress management (Table 3). Self-actualization, interpersonal support, and stress management are all psychosocial factors. Further longitudinal studies are recommended in order to explain the possible causal relationship between perceived busyness and psychosocial development. The essence and the contents of perceived busyness require a more detailed clarification as well.

BMI levels indicating obesity, when compared with the moderate BMI level, was shown to have a greater negative effect on stress management and on the overall HPLP, after controlling for other variables (Table 3). Higher than moderate BMI has been found to have negative effects on health[31]. Most of the health promotion programs for the higher BMI groups were therefore focused on nutrition and physical activities, and aimed to cut down weight and decrease the risk of cardiovascular diseases[32, 33]. Although stress management has been one of the most well-received health promotion programs for employees in Taiwan during recent years, interventions related to stress management have not been carried out specifically for the workers with obesity[26]. The findings of this study draw the attention to the importance of targeting this group for improving stress management, by developing new health promotion programs or expanding existing interventions (which currently focus on nutrition and exercise).

Among the controlled variables, age was found to have significantly positive effects on the overall HPLP, nutrition, health responsibility, self-actualization, and stress management. Walker[34], Duffy[15], and Pender[11] reported that age was positively related to the overall HPLP, providing support to our findings. Results from other studies[12, 16, 35] have suggested that older workers had higher scores on nutrition and health responsibility than did younger workers. In addition, Walker and other researchers[34] have found a positive relationship between age and stress management. However, findings from other studies that are not consistent with our results also exist. For instance, Lusk *et al.*[12] has found that younger workers had higher scores than older groups on self-actualization. Taken together, there seems to be no sufficient evidence to explain these inconsistent findings, hence precluding a clear conclusion to be drawn about the positive or negative effects of age on health-promoting behaviors. Further research with a qualitative approach might be helpful in providing richer information about the influence of age on health promotion practices.

Perceived health status can be seen as a significant determinant of the overall HPLP and all health-promoting behaviors. This finding is similar to previous studies using the HPLP, that have been conducted on workers and on the general population[11, 18]. According to the Health Promotion Model[9], perceived health status is also one of the significant predictors of health-promoting lifestyle. However, perceived health status is currently framed in a general term[23], and further study toward analyzing health status in greater detail could be undertaken. In addition, the issues of how people perceive their general health, the factors that influence this perception, and ways to improve an individual's subjective feelings of well-being have been relatively neglected in both the present study and previous research. Therefore, a study focusing on these issues would provide a valuable contribution to these results.

The use of convenience sampling is a limitation in this study. To ensure the accuracy of the data, and to negate the risk of the questionnaire being answered carelessly, this study only sampled workers who were willing to participate. However, this population of voluntary participants might have caused an overestimate of workers' engagement in overall health-promoting lifestyles and health-promoting behaviors: the conclusions therefore should be applied with caution. Further study, using a longitudinal design with random sampling, is recom-

mended in order to clarify the variables that facilitate the formation of health-promoting behaviors and the development of a health-promoting lifestyle.

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