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Original Article

The Effects of Lifestyle and Type A Behavior on the Life-Stress Process

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Abstract

To evaluate the effects of personal factors such as lifestyle and Thpe A behavior on the life-stress process, we analyzed data randomly collected from 428 metropolitan Tokyo residents. Path analysis techniques were implemented to examine the direct and indirect effects of lifestyle and the Type A behavior pattern between life events, subjective stress and depressive symptoms. The following results were obtained:

1. Persons with a healthy lifestyle perceived a lower subjective stress level.

2. Although females with a healthy lifestyle had fewer direct depressive symptoms, males with a healthy lifestyle had fewer indirect depressive symptoms due to alleviation of subjective stress.

3. Type A males perceived a lower subjective stress level and Type A females experienced more life events.

It is suggested that mental health is modified not only by lifestyle but also by Type A behavior in the life-stress process. In particular, the preservation and promotion of a healthy lifestyle appear to reduce subjective stress and may be an important factor for the improvement of mental ill health.

Key words: Life event, Lifestyle, Stress, Type A behavior, Health practice, Depressive symptom

Introduction

We have learned from many investigations that social and psychological stressors such as life events within a short time can play roles in causing the onset of physical and mental health problems [1-3]. Recently some studies indicated that personal factors such as social support [4,5], health practices [6], and the personality composite of hardiness [7] can modify the effect of life events. However, in Japan there are few studies concerning modifiers of the life-stress process. We think of lifestyle behavior as the most important personal factor in the stage of primary prevention. Berkman and Breslow [8] demonstrated in the Alameda County study that seven lifestyle items such as exercise, sleep, alcohol consumption and cigarette consumption determine the level of physical health status and mortality. We also reported that lifestyle among Japanese is related to chromosomal damage [9]. Therefore, we evaluated how lifestyle related to life-stress process.

In this study, we chose Type A behavior reflected by personality or character as another personal factor. The Type A behavior pattern (TABP) described by Friedman and Rosenman [10] has been recognized as a risk factor for coronary heart disease [11]. A large amount of research has indicated that Type A behavior is a valid predictor of coronary heart disease [12-14]. Type A behavior can be characterized by extremes of competitiveness, aggressiveness, striving for achievement and haste, restlessness, and a feeling of being under the pressure of time and the challenge of responsibility. Several investigators reported that Type A persons experience more stressful life events [13,14]. Early detection and intervention with healthy Type A's may be an important preventive factor.

The purpose of this study was to clarify the joint effects of lifestyle and Type A behavior on the life-stress process by path analysis techniques, and especially to evaluate the interactive effects of the two factors, which have been investigated independently, on the mental health status (subjective stress and the number of depressive symptoms) of urban residents. Data analysis suggests that lifestyle and Type A behvior can be important factors in the stress process and that understanding them will contribute much to an improvement in mental health status.

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Materials and Method

Subjects

Questionnaires were distributed to 822 randomly selected inhabitants of the Katsushika Ward, Tokyo who had undergone citizen medical examinations in 1988. Participation was voluntary, and 524 questionnaires were completed and mailed back (a response rate of 63.7%), of which all items of 428 could be used for statistical analysis purposes. The subjects comprised 104 males and 324 females. Almost all were married or had been married. The age of the respondents ranged from 18 to 78 years, with the mean age (±SD) of males being 47.66±12.13, and that of females 47.01±10.27.

Construction of questionnaire

We constructed the questionnaire to gather data about the following variables: life events, lifestyle, Type A behavior, and mental health status (subjective stress level and depressive symptoms). Questions about basic demographic characteristics, such as sex and age, also were included. Details of the measures are presented below.

Life events

To measure life events as stressors, we used a structured 29-item schedule based on the Holmes and Rahe Social Readjustment Rating Scale [15]. The subject was asked to judge how much effort it took to adjust to each of the 29 events during the past year. The judgments were made using a simple rating of 1 (least life change) to 5 (most life change). The life-events score was constructed by using a weighted sum of each life event subjects had experienced within one year.

Lifestyle

Morimoto modified eight lifestyle items to design a self-administered questionnaire composed of eight items on healthy lifestyle for use in a study in Japan [9], besed on that of Berkman and Breslow [8]. In this study, we chose seven of Morimoto's lifestyle items, excluding mental stress, because we hypothesized a stress causal model to evaluate the functions of lifestyle on the stress process (Table 1). Each item had 2 to 6 possible answers and was assigned a dichotomized value of 1 (good lifestyle) or 0 (poor lifestyle) according to Morimoto's criteria. They were accumulated to form a Health Practice Index (HPI) score of from 0 to 7, evaluating the comprehensive lifestyle. Each subject was classified into one of three categories; "poor" (HPI score=0-2), "moderate" (HPI score=3-5) or "good" (HPI score=6-7).

Table 1 Seven lifestyle items.

1. Physical exercise (exercising twice a week or more)
2. Alcohol consumption (not consuming alcohol every day)
3. Cigarette smoking (not smoking cigarettes)
4. Hours of sleep (sleeping 7 to 8 hr per night)
5. Nutritional balance (eating a nutritionally balanced diet)
6. Eating breakfast (eating breakfast every morning)
7. Hours of work (working less than or equal to 9 hr per day)

Note. The healthy lifestyle items recommended by Morimoto et al. are given in parentheses, and the seven items comprise a Health Practice Index (HPI).

Type A behavior

In this study we used a personality measure named the Type A pattern scale of Tokai University, designed for assessing the Type A behavior pattern among Japanese [16, 17]. The Type A behavior pattern scale of Tokai University consists of 36 items, with 4-point Likert-type rating continua.

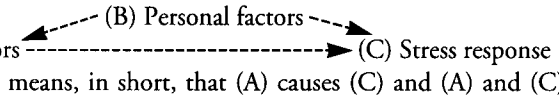
Mental health status

To assess mental health in a general population, we used self-rating of the subjective stress level and the Zung self-rating depression scale [18]. The self-rating of subjective mental stress was carried out using a single-item response scale. Each respondent was asked to assign a value of 1, 2, or 3 —— meaning low, average, or high —— to the respective answers.

Similarly, we used the Zung self-rating depression scale. This scale has had its validity demonstrated in several studies, including research verifying its sensitivity to depressive symptoms at the lower levels found in normal populations [19]. In Japan, the scale has been ascertained to have good internal consistency and test-retest reliability, and construct validity has been demonstrated in many research projects, including population surveys [20]. The scale contains 20 items using 4-point answer scales so that the more depressed respondents and complaints will have high scores.

Model and analytical procedures

We hypothesized the following causal model based on previous studies [21].



That means, in short, that (A) causes (C) and (A) and (C) are modified by (B). We hypothesized (A) life events, (B) lifestyle, Type A behavior, sex and age, and (C) mental health status, that is, the subjective stress level and the depressive symptoms. We especially selected lifestyle and Type A behavior among many personal factors in this causal model because we believe that lifestyle and Type A behavior are changeable personal factors in the stage of primary prevention. We believe that, in two kinds of stress responses; the subjective stress level may lead to an adverse health change within a relatively brief time after the occurrence of one or several life events, and when the subjective stress level is high, its stress response increases depressive symptoms [5]. The exogenous variables in the causal model are age and Type A behavior because age is unchangeable and the Type A behavior pattern is reflected by personality and character. The model has three causal stage: (1) The two exogenous variables determine life events and lifestyle, (2) the two exogenous variables, life-events variable and lifestyle variable determine the subjective stress level and (3) all five of the preceding variables determine the number of depressive symptoms (Fig. 1). Data analysis was by the Statistic Package for Social Sciences Extension (SPSS) program. The primary statistical technique used in this study was path analysis, the SPSS multiple regression analysis that estimates the direct and indirect relations among variables. The following procedure was used in the path analysis of the model. Standardized regression equations were established for each dependent variable in the saturated model. This computer program provides path coefficients (β, or the standard partial regression coefficient) and squared multiple correlations (R^2). Path coefficients with a magnitude of $|\pm 0.05|$ or greater were included.

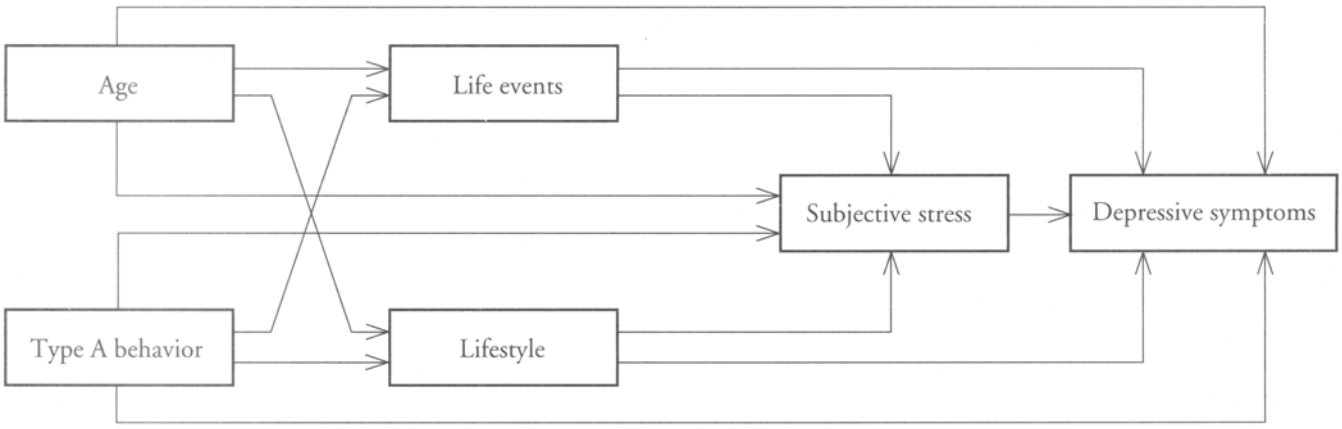


Fig. 1 Path model.

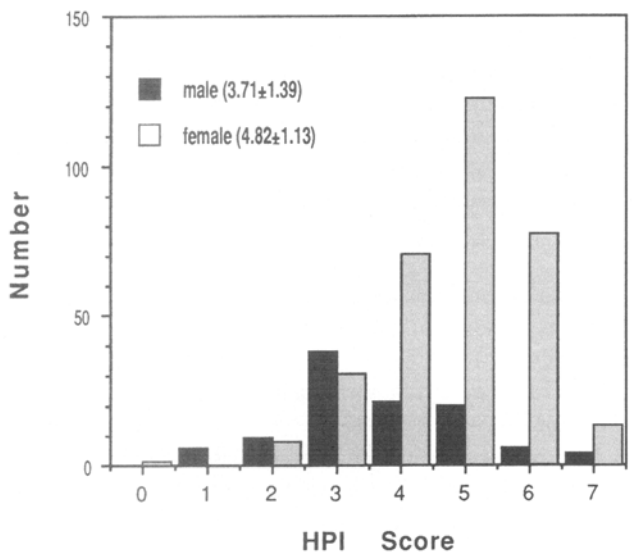


Fig. 2 Distribution of HPI scores for males and females.

New regression equations for the remaining paths were calculated to derive path coefficients in a reduced model. All predictor variables were entered simultaneously into the equations. Direct effects refer to standard partial regression coefficients (β) and the relationship between a predictor and an outcome, controlling for the other variables in the model. Indirect effects refer to the strength of the relationship a predictor has to an outcome that is variable through another mediator. In this model, age and Type A behavior can have only a direct effect. The other three endogenous variables, however, can have direct effects and indirect effects. In this study, we treated sex as a separate variable.

Results

Figure 2 shows the distribution of the HPI score among 428 subjects. The mean and standard deviation of each variable by sex in the surveyed population are shown in Table 2. The comparison of each variable shows significant differences in Type A behavior and lifestyle between males and females. Pearson's correlation coefficients were calculated for six variables (Table 3). Through use of the path analytic method described above, the

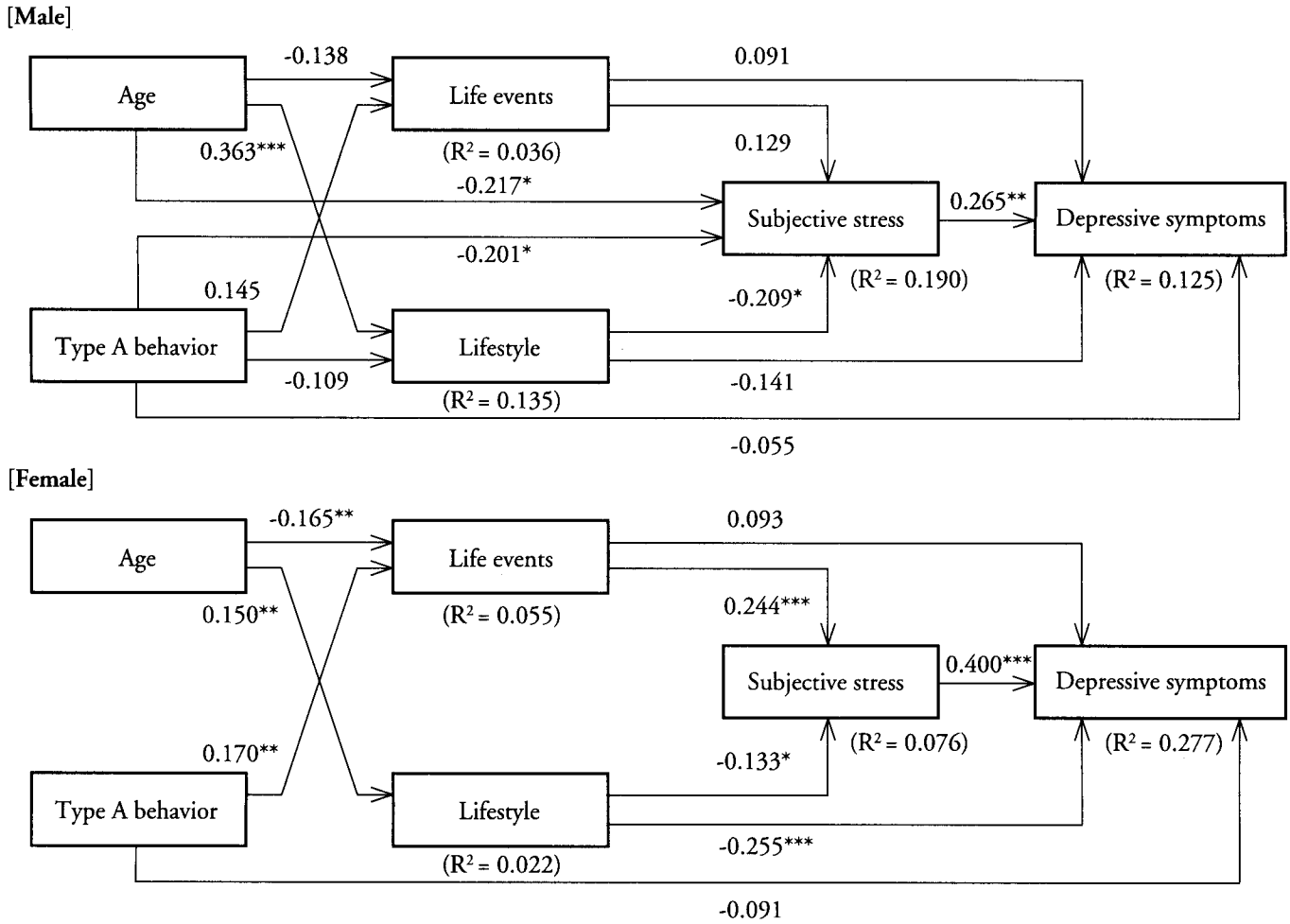
Table 2 Comparison of means and standard deviations of six variables by sex.

Variable		Male (N=104)	Female (N=324)	t test
Age	(X1)	46.63 ± 12.19	46.27 ± 10.27	ns
Type A behavior	(X2)	78.80 ± 9.98	75.06 ± 10.39	p<0.01
Lifestyle	(X3)	3.71 ± 1.39	4.82 ± 1.13	p<0.001
Life events	(X4)	6.19 ± 6.16	6.36 ± 6.87	ns
Subjective stress	(X5)	2.07 ± 0.67	1.93 ± 0.64	ns
Depressive symptoms	(X6)	39.71 ± 5.45	40.10 ± 6.50	ns

Table 3 Matrix of Pearson's correlation coefficients between six variables.

Variable		Male (N=104)					
		X1	X2	X3	X4	X5	X6
Age	(X1)		0.111	0.351***	-0.122	-0.284**	-0.119
Type A behavior	(X2)	0.015		-0.069	0.130	0.208*	0.021
Lifestyle	(X3)	0.150**	-0.026		-0.017	-0.301***	-0.219**
Life events	(X4)	-0.162**	0.168***	0.017		0.185*	0.135
Subjective stress	(X5)	-0.098*	0.061	-0.129**	0.242***		0.313***
Depressive symptoms	(X6)	-0.115*	-0.044	0.303***	0.170***	0.450***	
		Female (N=324)					

*P<0.05 **P<0.01 ***P<0.001



Note. The paths and path coefficients with a magnitude of |±0.05| or greater are shown. New regression equations on the remaining paths were calculated to derive path coefficients in a reduced model. Path coefficients are standard regression beta weights. R^2; Squared multiple correlations. *P<0.05, **P<0.01, ***P<0.001 by t test.

Fig. 3 Path diagram of the effect of lifestyle and Type A behavior on the life-stress process.

paths, path coefficients and the squared multiple correlation (R^2) in the model are presented in Fig. 3. The direct, indirect, and total effects on the dependent variables and the correlation were calculated. The variances accounting for subjective stress were 19.0% for males and 7.6% for females. The variances for depressive symptoms were 12.5% for males and 27.7% for females. The path diagram of the reduced model with its respective path coefficients illustrates several significant paths.

The findings indicated the following: in the male population (a) age was significantly positively related to lifestyle, (b) the males with high subjective stress levels had significantly many depressive symptoms, (c) a healthy lifestyle was significantly negatively related to subjective stress, (d) although the indirect effects of lifestyle and life events on depressive symptoms reported were smaller (-0.055 and 0.034, respectively) than the direct effects (-0.141 and 0.091, respectively), the indirect effect of Type A

Table 4 Age-controlled partial correlation coefficients (and P values) between seven lifestyle items and Type A behavior, life events, subjective stress and depressive symptoms.

Lifestyle items	Male (N=104)				Female (N=324)			
	Type A behavior	Life events	Subjective stress	Depressive symptoms	Type A behavior	Life events	Subjective stress	Depressive symptoms
Physical exercise	.002	.049	-.125	-.223**	.161**	-.025	-.117*	-.244***
Alcohol consumption	-.126	-.060	-.104	-.054	-.058	.058	-.080	-.001
Cigarette smoking	-.063	.109	.059	-.014	-.041	-.028	-.048	-.109*
Sleeping pattern	.109	.104	-.012	-.020	-.098*	.011	-.113*	-.093*
Nutritional balance	-.088	.058	-.149	-.198*	.081	.103*	.081	-.124**
Eating breakfast	-.056	.058	-.114	.039	-.025	-.038	-.028	-.225***
Working pattern	-.113	-.195*	-.260**	-.098	-.163**	.017	-.083	-.087
HPI score	-.116	.027	-.224**	-.190*	-.029	.043	-.116*	-.291***

*P<0.05 **P<0.01 ***P<0.001

Table 5 Relationships between Type A behavior, life events, subjective stress, and depressive symptoms and lifestyle.

[Male]

Lifestyle	Type A behavior	Life events	Subjective stress	Depressive symptoms
Good (n=10) (6-7)	79.70 ± 12.39	4.60 ± 4.81	1.40 ± 0.52	34.70 ± 5.64
Moderate (n=79) (3-5)	78.68 ± 9.92	6.58 ± 6.70	2.13 ± 0.65 **	40.24 ± 5.30 *
Poor (n=15) (0-2)	78.80 ± 9.17	5.20 ± 3.21	2.20 ± 0.68 **	40.27 ± 4.64 *

[Female]

Lifestyle	Type A behavior	Life events	Subjective stress	Depressive symptoms
Good (n=90) (6-7)	75.63 ± 11.18	6.32 ± 6.29	1.83 ± 0.62	37.77 ± 6.86
Moderate (n=225) (3-5)	74.76 ± 10.13	6.30 ± 7.13	1.95 ± 0.64 **	40.73 ± 6.06 ***
Poor (n=9) (0-2)	77.00 ± 9.10	8.11 ± 6.11	2.44 ± 0.53 *	47.78 ± 4.18 ***

Note. Subjects were classified by Health Practice Index (HPI) scores: good (6 or higher), moderate (3, 4, or 5), or poor (2 or lower) lifestyle habits.
*P<0.05 **P<0.01 ***P<0.001 by t test.

behavior on depressive symptoms was larger (0.093) than its direct effect (-0.055) and (e) a healthy lifestyle had the greatest total ameliorative effect on depressive symptoms (-0.196).

The findings indicated the following for the female population, (a) age was significantly positively related to lifestyle, (b) life events were significantly positively related to subjective stress and slightly positively related to depressive symptoms, (c) high subjective stress was strongly associated with depressive symptoms, (d) Type A behavior was significantly positively related to life events, (e) a healthy lifestyle was significantly negatively related to subjective stress and depressive symptoms and (f) the total effect of lifestyle on depressive symptoms was -0.308, with the direct effect (-0.255) being increased by the indirect effect (-0.053) via subjective stress. Likewise, the total effect of life events on depressive symptoms (0.191) was a combination of the direct effect (0.093) and the indirect effect through subjective stress (0.098).

We had a great interest in the effect of lifestyle on mental health status. Therefore, as shown in Table 4, the relations of Type A behavior, life events, and the two stress response measures (subjective stress level and Zung depression scale score) to each lifestyle item were examined. In the male population, a significantly negative association between life events and subjective stress and working hours was evident. The number of depressive symptoms was significantly negatively related to physical exercise and nutritional balance. In the female population, Type A behavior was positively related to physical exercise and significantly negatively related to the sleeping and working patterns. Subjective stress was significantly negatively related to physical exercise and to the sleeping pattern. The number of depressive symptoms was significantly negatively associated with physical exercise, smoking, nutritional balance, and breakfast. The correlations of the HPI score used to evaluate lifestyle items as a whole with the two stress measures (the subjective stress level and the Zung depression scale score) were highly significant, ranging from r=-0.190 to -0.224 in the male population and from r=-0.116 to -0.291 in the female population.

In both males and females, when the Health Practice Index (HPI) score was considered, the subjects with healthy lifestyles showed lower subjective stress levels and fewer depressive symptoms than those with poor lifestyles did (Table 5).

Discussion

Most investigators in life-events research have focused on linear relations between independent and dependent variables in the conceptual model of stress without assessment or control of intervening and mediating variables[21]. There have been many studies about the relationship between life events and depressive illness symptoms[22-25]. In our model, we included various other variables simultaneously; however, the relationship showed many complexity-produced interactive effects on the life-stress process.

We found that life events tended to cause many depressive symptoms through high subjective stress levels. Subjective stress seemed to be a rapid stress response caused by stressors previous to depressive symptoms. Fersguson and Horwood[25] developed a structural equation model and clarified the assertion that the predominant direction of causality was from life-events measures to depression measures, not vice versa, by using the path model technique[26]. Kuiper[27] demonstrated that the effect of perceived stress significantly increased depressive symptoms as the global stress level increased. Our results were consistent with theirs.

The female subjects with high life-events scores showed a higher subjective stress level than the male subjects did. This was considered to be caused by the difference of the effects of age or Type A behavior as personal factors in the life-stress process. The effects of lifestyle on subjective stress and depressive symptoms was significant for both males and females. The effect of personal lifestyle factors on the life-stress process was great within the limitations of the personal factors considered.

Berkman, Breslow[8] and Kusaka, Morimoto[28] proposed that poor lifestyle frequently brings on numerous problems in physical health; Maruyama et al[29] reported their effect also on mental health status; and Morimoto[9] suggested an effect on hereditary

status. Pratt[30], Williams & Wechler[31], and Matarazzo[32] found that a lower quality of health practices was related to a higher subjective level of health and to more health problems. For example, a lack or excess of sleep or little physical exercise might lead to depression, such as indecisiveness, irritability, and psychomotor agitation. These results include highly suggestive evidence that lifestyle may reduce the risk of stress-related illness in the face of stress.

Furthermore, after controlling for the effects of age, the HPI score was significantly negatively related to subjective stress and depressive symptoms (Table 4). When total lifestyles were divided into three groups (good HPI, moderate HPI and poor HPI), subjects with healthier lifestyles indicated a significantly better mental health status than those with poor lifestyles (Table 5). Promoting more-effective interventions in terms of lifestyle would appear to increase the power of resistance to mental illness.

As for each lifestyle item, those with sufficient physical exercise strongly tended to have fewer depressive symptoms both among males and females. Frederick[33], Farmer[34] and Simonsick[35] also demonstrated that physical exercise reduces depressive symptoms and improves mental health status.

In the perception of a life event, we consider it important to take the effect of personality into account[2]. Previous studies[36, 37] indicated that Type A persons reported more uncontrollable life events than Type B's did. We found Type A behavior to be a significant factor in the perception of life events as stressors in females who lived in Tokyo.

The effect of personality or character on the stress process has been studied with other potential personal factors. Kobasa[38] examined hardiness; Horwood and Ferguson[39] and Ormel[40] examined neuroticism; Aldwin[41] examined emotionality (a personality trait also known as neuroticism). These personality characteristics are known to be significantly associated with the reporting of life events.

We assessed personality characteristics by using a Type A behavior-pattern questionnaire. Although Cooper and Roden[42] reported that both Type A male and female tax officers in the United Kingdom are most vulnerable to overall mental ill health, in our study, the Type A males seemed to have a significantly lower subjective stress level. It is said that Type A behavior is modified by many factors such as culture, personal sense of values, way of life and the national traits[43]. Japanese Type A males are reported to be workaholics[16] but their subjective stress level was low. Overadaptation to their work as well as severe competition and groupism are considered to be the reasons for this finding. However, the total effect of Type A behavior on depressive symptoms was positive. Type A behavior was indicated as the main source of a great many life events for the females. In recognition of recent life events, they were influenced by how past experiences with various life events altered recent life-events values. Some life-evnets values might thereby be augmented for the females.

The methodological limitations of the current study should be considered in assessing our results. First, this study confirmed the effect of personal factors such as lifestyle and Type A behavior on the life-stress process for Tokyo residents. Further research is needed in relation to the effects of personal factors for different types of stressors or stress responses in different life stages and among different populations. Second, this study was a cross-sectional study. The findings should be interpreted considering these limitations. Thus, further prospective studies are needed to clarify the theoretical causal mechanism of modifiers in the life-stress process.

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