

Dietary Behaviour, Coping Style and Fatigue among College Students with Normal Mental Status: A Cross-Sectional Study in Southern China

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Abstract: Fatigue has been found to be typical prevalent among college students. However, until now, studies on the effect of dietary behaviour and coping style on fatigue among college students are still few, especially for those with normal mental status. Therefore, the aim of this study is to examine the association of dietary behaviour and coping style with fatigue among college students with normal mental status. Based on a cross-sectional survey, 778 college students with normal mental status were recruited. Fatigue was examined by the Chalder Fatigue Scale (CFS). Clustered multiple linear regressions were used to explore the association of dietary behaviour and coping style with fatigue. Better dietary behaviour was significantly associated with the lower physical fatigue (PF), mental fatigue (MF) and total fatigue (TF) scores, and its independent contribution accounted for 36.6%, 20.5% and 31.9%, respectively. Those who tended to take positive coping style had the lower PF, MF and TF scores, but negative coping style was the opposite, and the independent contribution accounted for 28.2%, 31.6% and 30.9%, respectively. Dietary behaviour and coping style are in a degree the independent predictors of fatigue among college students with normal mental status.

Keywords: Dietary behaviour, coping style, Fatigue, College students, Normal mental status

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1. Introduction

Fatigue is typically defined as extreme and persistent tiredness, weakness or exhaustion-mental, physical or both ^[1], According to international studies in general population, reports differed on the prevalence of fatigue with ranges of 2.72%-75.7% ^[2]. which has been risen much attention throughout the world. Researchers have found that fatigue played a key role in affecting cognitive and skilled performance among workers of company or industry ^[3], but studies on fatigue among college students were quite rare. As we know, a good cognitive performance is definitely the necessary part college students need to successfully complete their studies. Therefore, it is greatly important to early identify the individuals at high risk of fatigue among college students.

Several researchers have started to investigate the risk factors of fatigue among college students, but they mainly focused on socio-demographic variables, and some commonly health and lifestyle-related variables ^[4-5], like physical activity, smoking, drinking. Dietary behaviour is considered as an important component of lifestyle variables in adolescents, when it comes to its relationship with fatigue, it has received little attention among college students. However, The association of dietary behaviour with fatigue has been investigated in other populations ^[6-7]. For instance, Weiland et al concluded that after adjusting for level of disability and socio-economic status of multiple sclerosis patients in a global cross-sectional study, fatigue still increased with poor diet; Baguley et al clarified that the mediterranean-style diet resulted in statistically significant and clinically meaningful reductions in cancer-related fatigue at both 8-weeks and 12-weeks compared to usual care.

College students are generally 18 ~24 years old, so their psychology is still in the immature stage. When facing the changes of living environment and social network, the pressure of academic performances and employment, their coping ability is relatively insufficient. Coping style is defined as thoughts and actions that individuals use to manage and reduce the impacts of traumatic and stress-inducing situations ^[8]. It has been considered to be an important indicator for predicting health status of students at university. Although report has shown that poor coping skills were significantly associated with lockdown-induced fatigue during the COVID-19 pandemic ^[9], unfortunately, related researches were very scant, and the evidence also remained insufficient due to the reported results inconsistent in different study populations.

From a perspective of health, social supports are important and necessary for individuals. Besides, previous studies regarded mental health-related variables, like depression, anxiety, as the key covariates in investigating predictors of fatigue ^[10-11]. Thus, in order to examine the association of dietary behaviour and coping style with fatigue, to explore their independent contributions among college students, we conducted this survey among college students with normal mental status. and also collected the social support-related variables.

Accordingly, the aim of this study is to explore whether dietary behaviour and coping style were associated with fatigue independent of socio-demographic variables, health and lifestyle-related characteristics, and social support-related factors among college students,

especially for those with normal mental status. Our results may provide supporting information for school and relevant healthcare providers in preventing or improving fatigue among students.

2. Materials and Methods

2.1. Study design and participants

A cross-sectional survey was conducted from 4 universities of Shanghai in China between November-December 2020. The survey samples were selected using a random cluster sampling method. Students were included if they 1) lived in school; 2) had a normal mental status. The exclusion criteria were as follows: 1) refused to participate in this study; 2) with missing or invalid data on fatigue variables. 778 eligible participants were recruited in finally analysis.

2.2. Procedures

All research data were collected via face to face interviews in school using structured questionnaires. In order to improve data collection skills and standardize data collection methods, the interviewers received specific training in advance. Each subject received written information about the aim of the study. If he/she decided to participate, a written informed consent was obtained.

2.3. Participants' characteristics

For identifying potential factors linked to fatigue, our study team first reviewed a large amount of literatures, and consulted related research professors. Finally, the following variables were included in this survey: socio-demographic factors (gender, Only child, home address, medical students, grade), lifestyle-related factors (smoking, drinking, physical exercise), health-related factors (body mass index (BMI), self-reported chronic diseases), dietary behaviour, coping style (Simple Coping Style Questionnaire (SCSQ) domains), social support-related factors (Perceived Social Support Scale (PSSS) domains).^[4-5, 12]. Smoking status was defined as smoking one or more cigarettes per day for at least six months. Drinking was defined as drinking alcohol for at least once a week during the past year. Physical exercise was assessed by answering the following question: "How many times do you exercise every week? (more than three times/week, one to two times/week and no exercise)". The BMI was calculated as weight (kg) divided by the square of height (m²). Self-reported chronic diseases were obtained by the responses to the question: "Have you been diagnosed with chronic diseases? (yes/no)".

2.4. Measurements

2.4.1. Chalder Fatigue Scale

The 11-item Chalder Fatigue Scale (CFS) with a Cronbach's alpha of 0.863 was applied to assess fatigue during the past month^[13], including physical fatigue (PF) (items 1-7) and mental fatigue (MF) (items 8-11). Participants reported their fatigue on items with two-points-scale. Each item was scored 0 or 1, the total fatigue (TF) scores ranged from 0 to 11. Fatigue was defined as CFS score ≥ 4 , with a higher score indicating a higher degree of fatigue.^[14]

2.4.2. General Health Questionnaire-20

Mental status was measured with the Chinese version of General Health Questionnaire-20

items (GHQ-20) (Chinese version) ^[15-16]. The questionnaire consisted of 20 items with 3 subscales, including self affirmation scale (item 1-9), depression scale (item 10-15) and anxiety scale (item 16-20). And the Self affirmation scale positive implied psychological health, but the depression and anxiety scales negatively indicated psychological distress. Each item was scored using a positive scoring system with “1=Yes ”and” 0=No”, except for the item 7 and item 10, which were scored reversely. The total scores ranged from 0 to 20. Normal mental status was defined as scores < 10.

2.4.3. Dietary Behaviour Scale

Dietary condition was assessed using the Dietary Behaviour Scale (Chinese version) , which was based on the Nutrition Knowledge, Attitude And Behaviors Scale ^[17]. The scale was composed of 14 items with responses over a 3-point scale (1=never, 2=sometimes, 3=often), but the item 4, 5, 8, 11, 12 were scored reversely. The total scores ranged from 14 to 42, with higher scores indicating better dietary behaviour.

2.4.4. Simple Coping Style Questionnaire

Coping style was measured with the 20-item Simple Coping Style Questionnaire (Chinese version) ^[18]. The questionnaire consisted of 2 subscales with positive coping style scale (item 1-12) and negative coping style scale (item 13-20). Each item was scored using a 4-point scale (0-3), which ranged from “0=never”, to “3=often”.

2.4.5. Perceived Social Support Scale

Perceived social Support was assessed by 12-item the Perceived Social Support Scale^[19]. The scale was composed of 3 subscales with family support scale (item 3, 4, 8, 11), friend support (item 6, 7, 9, 12), and other support scale (item 1, 2, 5, 10). Each item was scored using a 7-point scale (1-7), which ranged from “1=strongly disagree” to “7=strongly agree”, with higher scores indicating higher perceived social support.

2.5. Statistics analysis

Data analyses were performed by the Statistical Package for the Social Sciences (SPSS) V.21.0 (SPSS, Chicago, Illinois, USA). Data are presented as the mean±SD, frequencies (percentage) and correlation coefficient. The association of socio-demographic factors, lifestyle-related factors, health-related factors, dietary behaviour, coping style, social support-related factors with fatigue using univariate and multivariate analyses. Univariate analyses involved the t test, chi-square test, one-way analysis of variance (ANOVA) and Pearson correlation. Multivariate analysis referred to the clustered multiple linear regression analysis, where the PF, MF and TF were considered as dependent variables, respectively. A two-tailed $p < 0.05$ was regarded as the statistical significance.

Clustered multiple linear regression analysis was performed to investigate the impacts of cluster 1 (socio-demographic factors), cluster 2 (lifestyle-related factors), cluster 3 (health-related factors), cluster 4 (dietary behaviour), cluster 5 (coping style), and cluster 6 (social support-related factors) on fatigue. There may exist multidirectional association between 6 clusters and dependent variables. In other words, cluster 1 variables may affect cluster 2-6 and the

dependent variables, cluster 2 may impact for cluster 3-6 and the dependent variables, cluster 3 may impact cluster 4-6 and the dependent variables, cluster 4 may impact cluster 5-6 and the dependent variables, cluster 5 may impact cluster 6 as well as the dependent variables, while cluster 6 may only affect the dependent variables ^[20]. The final regression model was determined in following 6 steps: (1) A forward stepwise regression of the dependent variables for the cluster 1 variables; (2) A forward stepwise regression for the cluster 2 variables with the equation derived from step 1 as a fixed part of the new regression model; (3) A forward stepwise regression for the cluster 3 variables with the equation derived from step 2 as a fixed part of the new regression model; (4) A forward stepwise regression for the cluster 4 variables with the equation derived from step 3 as a fixed part of the new regression model; (5) A forward stepwise regression for the cluster 5 variables with the equation derived from step 4 as a fixed part of the new regression model; (6) A forward stepwise regression for the cluster 6 variables with the equation derived from step 5 as a fixed part of the new regression model.

The independent effect of each cluster on the dependent variable was calculated by the corresponding R^2 values. The independent contribution of each cluster was calculated as individual R^2 change / total R^2 change in the final model $\times 100\%$ ^[21].

3. Results

3.1. Participants' characteristics

A total of 778 respondents were included in our study. Among them, most were female (80.1%), only child (55.4%), medical students (75.6%), sophomore (74.9%), and more than half of students lived in city and town, It has been found that fatigue was more likely to occur among those who drank alcohol (71.4% vs 52.7%), took no exercise (72.9% vs 46.7%) and had self-reported chronic diseases (78.1% vs 55.0%), and they also had the higher PF (Drinking: 3.80 vs 3.10; Physical exercise: 3.96 vs 2.66; Self-reported chronic diseases: 4.50 vs 3.17), MF (Drinking: 1.47 vs 1.08; Physical exercise: 1.57 vs 1.03; Self-reported chronic diseases: 2.19 vs 1.10), TF scores (Drinking: 5.26 vs 4.18; Physical exercise: 5.53 vs 3.70; Self-reported chronic diseases: 6.69 vs 4.27). Further, our study showed that dietary behaviour, negative coping style and all PSSS domains were positively associated with fatigue, but the positive coping style had a negatively link to fatigue ($p < 0.05$). More details of the participants' characteristics were presented in Table 1 and Table 2.

Table 1. Fatigue and its prevalence among different subgroups (n=778)

Variable	Fatigue group	Non-fatigue group	Entire sample	<i>P</i>
Cluster 1: socio-demographic factors				
Gender (<i>n</i> , %)				0.630

Male	84 (54.2)	71 (45.8)	155 (19.9)	
Female	351 (56.3)	272 (43.7)	623 (80.1)	
Only child (<i>n</i> , %)				0.661
Yes	244 (56.6)	187 (43.4)	431 (55.4)	
No	191 (55.0)	156 (45.0)	347 (44.6)	
Home address (<i>n</i> , %)				0.809
City and town	338 (55.7)	269 (44.3)	607 (78.0)	
Countryside	97 (56.7)	74 (43.3)	171 (22.0)	
Medical student (<i>n</i> , %)				0.767
Yes	327 (55.6)	261 (44.4)	588 (75.6)	
No	108 (56.6)	82 (43.2)	190 (24.4)	
Grade (<i>n</i> , %)				0.268
Freshman	95 (61.3)	60 (38.7)	155 (19.9)	
Sophomore	320 (54.9)	263 (45.1)	583 (74.9)	
Junior	20 (50)	20 (50)	40 (5.2)	
Cluster2: lifestyle-related factors				
Smoking (<i>n</i> , %)				0.555
Yes	34 (59.6)	23 (40.4)	57 (7.3)	
No	401 (55.6)	320 (44.4)	721 (92.7)	
Drinking (<i>n</i> , %)				<0.001
Yes	95 (71.4)	38 (28.6)	133 (17.1)	
No	340 (52.7)	305 (47.3)	645 (82.9)	
Physical exercise (<i>n</i> , %)				0.001
Over 3 times/week	71 (46.7)	81 (53.3)	152 (19.5)	
1~2 times/week,	313 (56.3)	243 (43.7)	556 (71.5)	
Take no exercise	51 (72.9)	19 (27.1)	70 (9)	
Cluster3: health-related factors				
Body mass index (<i>m</i> , SD)	21.56±4.70	21.57±4.37	21.56±4.55	0.974
Self-reported chronic diseases (<i>n</i> , %)				0.01
Yes	25 (78.1)	7 (21.9)	32 (4.1)	
No	410 (55.0)	336 (45.0)	746 (95.9)	
Cluster4: dietary behaviour (<i>m</i>, SD)	31.38±2.83	32.84±2.89	32.02±2.95	<0.001
Cluster5: coping style				
SCSQ domains (<i>m</i> , SD)				
Positive coping style	1.60±0.52	1.80±0.59	1.69±0.56	<0.001
Negative coping style	1.24±0.52	1.04±0.56	1.15±0.55	<0.001
Cluster6: social support-related factors				

PSSS domains (<i>m</i> , SD)				
Family support	15.15±7.15	20.68±6.02	17.59±7.22	<0.001
Friend support	18.54±5.99	20.29±5.83	19.31±5.98	<0.001
Other support	18.01±5.64	19.95±5.65	18.86±5.72	<0.001
PF score (<i>m</i> , SD)	4.79±1.63	1.24±1.04	3.22±2.25	<0.001
MF score (<i>m</i> , SD)	1.77±1.62	0.36±0.62	1.15±1.20	<0.001
TF score (<i>m</i> , SD)	6.55±2.08	1.60±1.12	4.37±3.00	<0.001

Notes: Data presented are mean± SD or *n* (%).

SCSQ=Simple Coping Style Questionnaire; PSSS=Perceived Social Support Scale; PF=physical fatigue; MF=mental fatigue; TF=total fatigue.

The significance of bold values represented $P < .05$.

Table 2. The association of study participants characteristics with fatigue.(n=778)

Variable	PF	<i>P</i>	MF	<i>P</i>	TF	<i>P</i>
Cluster 1: socio-demographic factors						
Gender (<i>m</i> , SD)		0.310		0.223		0.784
Male	3.06±2.19		1.25±1.25		4.31±3.01	
Female	3.26±2.26		1.12±1.18		4.38±3.00	
Only child (<i>m</i> , SD)		0.067		0.182		0.401
Yes	3.35±2.27		1.10±1.19		4.45±3.02	
No	3.06±2.21		1.21±1.21		4.27±2.98	
Home address (<i>m</i> , SD)		0.441		0.832		0.623
City and town	3.28±2.24		1.14±1.20		4.40±2.99	
Countryside	3.11±2.28		1.16±1.19		4.27±3.05	
Medical student (<i>m</i> , SD)		0.904		0.012		0.361
Yes	3.23±2.29		1.08±1.17		4.31±3.04	
No	3.21±2.13		1.34±1.24		4.54±3.04	
Grade (<i>m</i> , SD)		0.670		0.846		0.667
Freshman	3.36±2.26		1.19±1.26		4.55±3.09	
Sophomore	3.19±2.26		1.14±1.19		4.33±3.00	
Junior	3.10±2.04		1.10±1.13		4.20±2.79	
Cluster 2: lifestyle-related factors						
Smoking (<i>m</i> , SD)		0.137		0.072		0.067
Yes	3.65±2.33		1.42±1.31		5.07±3.20	
No	3.19±2.24		1.12±1.19		4.31±2.88	
Drinking (<i>m</i> , SD)		0.001		0.001		<0.001
Yes	3.80±2.08		1.47±1.11		5.26±2.76	

No	3.10±2.27		1.08±1.19		4.18±3.02	
Physical exercise (<i>m</i> , SD)		<0.001		<0.001		<0.001
Over 3 times/week	2.66±2.08		1.03±1.12		3.70±2.81	
1~2 times/week,	3.28±2.25		1.12±1.19		4.41±2.98	
Take no exercise	3.96±2.36		1.57±1.34		5.53±3.26	
Cluster 3: health-related factors						
Body mass index (<i>r</i>)	0.021	0.559	0.009	0.812	0.019	0.595
Self-reported chronic diseases (<i>m</i> , SD)		0.001		<0.001		<0.001
Yes	4.50±2.36		2.19±1.31		6.69±3.13	
No	3.17±2.23		1.10±1.17		4.27±2.96	
Cluster 4: dietary behaviour(<i>r</i>)	-0.268	<0.001	-0.218	<0.001	-0.286	<0.001
Cluster 5: coping style						
SCSQ domains(<i>r</i>)						
Positive coping style	-0.179	<0.001	-0.140	<0.001	-0.190	<0.001
Negative coping style	0.176	<0.001	0.231	<0.001	0.224	<0.001
Cluster 6: social support-related factors						
PSSS domains(<i>r</i>)						
Family support	-0.156	<0.001	-0.185	<0.001	-0.191	<0.001
Friend support	-0.096	<0.001	-0.241	<0.001	-0.168	<0.001
Other support	-0.118	<0.001	-0.258	<0.001	-0.190	<0.001

Notes: Data presented are mean (SD) or *r*.

SCSQ=Simple Coping Style Questionnaire; PSSS=Perceived Social Support Scale; PF=physical fatigue; MF=mental fatigue; TF=total fatigue; *r*=correlation coefficient.

The significance of bold values represented $P < .05$.

3.2. Prevalence of fatigue

In this study, the mean TF score was 4.37 ± 3.00 with PF score of 3.22 ± 2.25 and MF score of 1.15 ± 1.20 (shown in Table 1).

3.3. Clustered multiple linear regression models

In order to explore the independent attribution of dietary behaviour and coping style to fatigue, clustered multiple linear regression models were conducted for PF, MF and TF (shown in Table 3-5).

Table 3. Clustered multiple linear regression models explaining PF by socio-demographic factors (cluster 1), lifestyle-related factors (cluster 2), health-related factors (cluster 3), dietary behaviour (cluster 4), mental health-related factors (cluster 5) and social support-related factors (cluster

6) .(n=778).

Variable ^a	<i>B</i>	<i>P</i>	Adjusted ^b R ²	Independent contribution (%) ^c
Cluster 2				
Drinking	0.711	<0.001		
Physical exercise	-0.648	<0.001		
Total			0.034	23.9
Cluster 3				
Self-reported chronic diseases	1.248	0.002		
Total			0.045	7.7
Cluster 4				
Dietary behaviour	-0.181	<0.001		
Total			0.097	36.6
Cluster 5				
Positive coping style	-0.729	<0.001		
Negative coping style	0.771	<0.001		
Total			0.137	28.2
Cluster 6				
Family support	-0.026	0.022		
Total			0.142	3.6

Notes: *B*= regression coefficients; PF=physical fatigue.^aOnly variables with $p < .05$ were included in the model.^bAdjusted R² is the variance of in the dependent variable (PF) explained by all independent variables included in the regression model.^cThe independent contribution of each cluster of predictors to the variation for PF was calculated as individual corresponding R² change/total R² change in the final model $\times 100\%$.The significance of bold values represented $p < .05$.

Table 4. Clustered multiple linear regression models explaining MF by socio-demographic factors (cluster 1), lifestyle-related factors (cluster 2), health-related factors (cluster 3), dietary behaviour (cluster 4), mental health-related factors (cluster 5) and social support-related factors (cluster 6) .(n=778).

Variable ^a	<i>B</i>	<i>P</i>	Adjusted ^b R ²	Independent contribution (%) ^c
Cluster 1				
Medical student	-0.252	0.012		
Total			0.007	4.1

Cluster 2				
Drinking	0.349	0.002		
Physical exercise	-0.228	0.005		
Total			0.026	11.1
Cluster 3				
Self-reported chronic diseases	1.015	<0.001		
Total			0.053	15.8
Cluster 4				
Dietary behaviour	-0.080	<0.001		
Total			0.088	20.5
Cluster 5				
Positive coping style	-0.366	<0.001		
Negative coping style	0.522	<0.001		
Total			0.142	31.6
Cluster 6				
Other support	-0.040	<0.001		
Total			0.171	16.9

Notes: *B*= regression coefficients; MF=mental fatigue.

^aOnly variables with $p < .05$ were included in the model.

^bAdjusted R^2 is the variance of in the dependent variable (MF) explained by all independent variables included in the regression model.

^cThe independent contribution of each cluster of predictors to the variation for MF was calculated as individual corresponding R^2 change/total R^2 change in the final model $\times 100\%$.

The significance of bold values represented $p < .05$.

Table 5. Clustered multiple linear regression models explaining TF by socio-demographic factors (cluster 1), lifestyle-related factors (cluster 2), health-related factors (cluster 3), dietary behaviour (cluster 4), mental health-related factors (cluster 5) and social support-related factors (cluster 6). (n=778).

Variable ^a	<i>B</i>	<i>P</i>	Adjusted ^b R^2	Independent contribution (%) ^c
Cluster 2				
Drinking	1.102	<0.001		
Physical exercise	-0.874	<0.001		
Total			0.039	20.4
Cluster 3				
Self-reported chronic	2.287	<0.001		

diseases			
Total		0.061	11.5
Cluster 4			
Dietary behaviour	-0.281	<0.001	
Total		0.122	31.9
Cluster 5			
Positive coping style	-1.098	<0.001	
Negative coping style	1.280	<0.001	
Total		0.181	30.9
Cluster 6			
Family support	-0.045	<0.001	
Total		0.191	5.3

Notes: B= regression coefficients; TF=total fatigue.

^aOnly variables with $p < .05$ were included in the model.

^bAdjusted R² is the variance of in the dependent variable (TF) explained by all independent variables included in the regression model.

^cThe independent contribution of each cluster of predictors to the variation for TF was calculated as individual corresponding R² change/total R² change in the final model $\times 100\%$.

The significance of bold values represented $p < .05$.

In this study, except for the cluster 1, other 5 clusters were related to PF and TF, and all 6 clusters correlated with MF. In cluster 1, compared to non-medical students, medical students had lower MF scores, and the independent contribution was 4.1%. In cluster 2, drinking positively correlated with PF, MF and TF, but physical exercise displayed a negative association, and the independent contribution was 23.9%, 11.1% and 20.4%, respectively. For cluster 3, those who had self-reported chronic diseases were more likely to have higher PF, MF, and TF scores with 7.7%, 15.8% and 11.5% independent contribution, respectively. In terms of cluster 4, better dietary behaviour was significantly associated with the lower PF, MF and TF scores ($B=-0.181$, $P < 0.001$; $B=-0.080$, $P < 0.001$; $B=-0.281$, $P < 0.001$), the independent contribution was 36.6%, 20.5% and 31.9%, respectively. When it comes to the cluster 5, those who tended to take positive coping style had the lower PF, MF and TF scores ($B=-0.729$, $P < 0.001$; $B=-0.366$, $P < 0.001$; $B=-1.098$, $P < 0.001$), but those who were more likely to take negative coping style had the higher PF, MF and TF scores ($B=0.771$, $P < 0.001$; $B=0.522$, $P < 0.001$; $B=1.280$, $P < 0.001$), and the independent contribution was 28.2%, 31.6% and 30.9%. In cluster 6, only the family support was negatively linked to PF and TF, the independent contribution was 3.6% and 5.3%, but only the other support was negatively related to MF, the independent contribution was 16.9%.

Most notably, we found that the top two clusters with the independent contribution to PF, MF, and TF were both the cluster 4 (dietary behaviour) and cluster 5 (positive coping style, negative coping style) (shown in Figure 1).

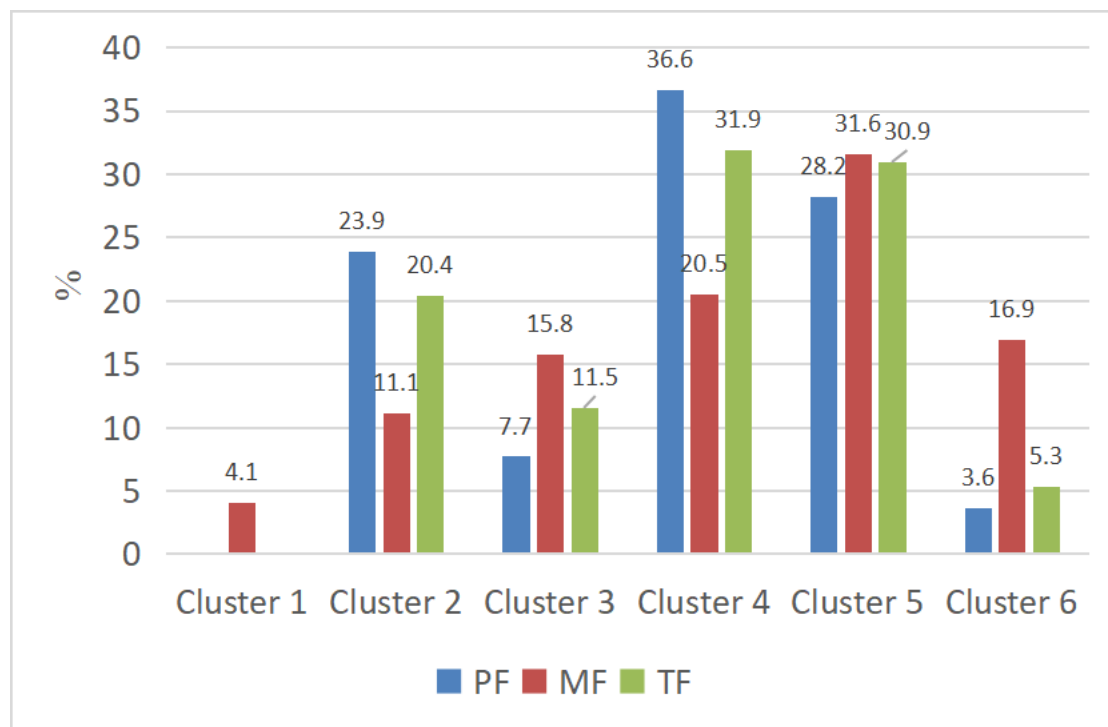


Figure 1 The independent contributions of six clusters to fatigue (PF=physical fatigue; MF=mental fatigue; TF=total fatigue)

4. Discussion

4.1. Main findings

In this study, we examined the prevalence and the association of dietary behaviour and coping style with fatigue among college students with normal mental status. The results showed that dietary behaviour and positive coping style were significantly associated with lower PF, MF and TF scores independent of socio-demographic variables, health and lifestyle-related characteristics, and social support-related factors, but negative coping style was just the opposite. Moreover, the top two clusters with the independent contribution to PF, MF, and TF were both the dietary behaviour and coping style. These findings suggested that dietary behaviour and coping style were important predictors of fatigue.

4.2. Comparing with previous studies

Our study showed that some participants experienced fatigue, which was similar to Zheng's findings [10, 22-24]. Further, in our study, the mean TF score was 4.37 ± 3.00 with PF score of 3.22 ± 2.25 and MF score of 1.15 ± 1.20 , which were higher than that was observed among adults aged 18-45 years old from a previous study [24]. The COVID-19 pandemic may be the key factor resulting in this the difference. During the pandemic, some lockdown policies were taken, such as restricting various forms of social activities, staying at home if necessary. Reports from the USA and India suggested that individuals under prolonged lockdown circumstances were more likely to be tired and fatigued [25-26]. Apart from that, interpretations for this variant finding may be also

due to different measurements and types of fatigue, or the variance of population studied.

In the current study, college students with higher dietary behaviour scores had lower PF, MF and TF scores after adjusting for socio-demographic variables, health and lifestyle-related characteristics, coping style and social support-related factors. It meant that dietary behaviour was negatively associated with fatigue, which was in line with that of a previous study conducted in Korean college students [27]. Their study found that there was a significant negative correlation between self-reported fatigue scores and dietary habit scores such as “eating meals at regular times”, “eating foods such as meat, fish, eggs, and beans more than two times a day”, “eating greenish yellow vegetable every meal”, and “avoiding eating sweet foods everyday”. Furthermore, recent epidemiological studies revealed that dietary behaviour, like high levels of fish, vegetables and fruit, could reduce cancer-related fatigue [7, 28]; Jones et al demonstrated that Omega three fatty acid blood levels and supplementation with an omega three fatty acid supplement also displayed positive outcomes in relation to CFS symptom alleviation in other populations [29]. Specifically, except for the coping style, the independent contribution of dietary behaviour to fatigue was higher than other variables. Inflammation may play a key role in explaining the association of dietary behaviour with fatigue. Related research suggested that pro-inflammatory markers, like C-reactive protein, interleukin-6, Interleukin-8 was linked to fatigue [30]. At the same time, Riccio et al have found that high caloric diet could cause chronic low-grade inflammation, which led to the perception of fatigue [31]. and anti-inflammatory diets, such as fruits, vegetables, high dietary fibre, could improve fatigue [32].

Copings are cognitive and behavioural efforts at managing internal or external stress. Our results showed that those who tended to take positive coping style had the lower PF, MF and TF scores, but those who were more likely to take negative coping style had the higher PF, MF and TF scores. In other words, positive coping style was negatively associated with fatigue, and the negative coping style was the opposite, which was similar to a prior study [12]. It showed that poor coping ability was significantly correlated with the occurrence of CFS. In addition, a randomized controlled study conducted in US, reported that subjects with CFS are more likely to take escape-avoiding behavior than those in control group [33]. Surprisingly, the independent contribution of coping style was higher than all other variables in our study. Therefore, coping style should be considered an important factor in managing health condition of college students, even those with normal mental status.

Strengths and limitations of Our Study

To the best of our knowledge, the association of dietary behaviour and coping style with fatigue, and its independent contribution to fatigue among college students, especially for those with normal mental status, was explored for the first time. Moreover, we fully considered various variables, involving socio-demographic factors, health and lifestyle-related factors, mental health-related factors and social support-related factors. However, this study has several limitations. First, the data in our analyses were based on self-reports, which could lead to biases

or inaccuracies. Second, this was a cross-sectional study, so the observed associations should not be assumed to be causal relationships. Further in-depth studies with longitudinal follow-up data are warranted to explore the cause-effect relationship.

5. Conclusions

Dietary behaviour and coping style were in a degree the independent predictors of fatigue. Based on that, there might be great implications for highlighting the importance of dietary behaviour and coping style, and providing the direction of improving fatigue among college students with normal mental status.

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