

## Comparison of Health Promoting Lifestyle Predictors in High School Students with and without Overweight and Obesity: An Application of Health Promotion Model

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### Abstract

**Background:** Adolescents who have overweight and obesity face many physical and psychological problems and this condition may extend to adult life. The aim of this study was to compare factors related to health promotion lifestyle based on Pender Health Promotion Model (HPM) among high school students with and without overweight and obesity.

### Materials and Methods

This was a comparative cross-sectional study conducted on high school students in Deyyer city, Bushehr province, Iran. 353 students (180 students with overweight and obesity and 173 without overweight and obesity) were studied. The data collection tool consisted of three sections (baseline characteristics, HPM constructs and Health-Promoting Lifestyle Profile II). Data were analyzed using SPSS software version 22.0.

**Results:** The mean score of health promoting lifestyle behaviors in spiritual-growth ( $p<0.029$ ), responsibility ( $p<0.02$ ), stress-management ( $p<0.002$ ), physical-activity ( $p<0.001$ ), healthy-eating ( $p<0.002$ ), in students with overweight and obesity were significantly lower than those without overweight and obesity. According to the results of regression analysis, predictors of health promoting lifestyle between two groups of students were different. The only predictor construct of healthy lifestyle in adolescents without overweight and obesity was perceived self-efficacy ( $p<0.001$ ), and in students with overweight and obesity in addition to perceived self-efficacy ( $p=0.030$ ), perceived barriers ( $p=0.015$ ), also predicted students' health promoting lifestyle.

**Conclusion:** The results of this study showed that students with overweight and obesity had a poor health promoting lifestyle compared to those without overweight and obesity. In general, to improve the health-promoting lifestyle, implementation of educational interventions based on the HPM with emphasis on self-efficacy for normal weight students and self-efficacy and perceived barriers constructs for obese and overweight students are recommended.

**Key Words:** Health Promoting Lifestyle, Health Promotion Model, Obesity, Overweight, Students.

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## 1- INTRODUCTION

Today adolescents and their related issues have become very important and challenging, as their population has grown unprecedented. According to the UN report in 2014 there are approximately 1.8 billion adolescents living worldwide, most of whom are in less developed countries (1, 2). Iran has one of the youngest populations in the world and according to the latest census in 2016, more than 17 million of the country's total population are adolescents and young, aged 10 to 24 years (3). One of the most serious problems in adolescent health, is obesity and overweight, which has become a serious problem worldwide. Overweight and obesity is a complex health condition with various causes that results in the accumulation of large amounts of fat and disrupts the balance of energy consumption of the body (4).

The available evidence shows that the prevalence rates of overweight and obesity in Iranian adolescents is about 11% which varies in different districts (5, 6). The results of a study in Ilam, in the west of Iran showed that 19.5% of students were overweight or obese (4). In Shiraz, 8% of 11-17-year olds were obese and 17% were overweight, according to a study conducted in 2010-2011 (7). The results of a 2012 study in Bushehr also showed that 7.1% of 14 to 17-year-old adolescent girls were obese and 14.5% were overweight (8). Overweight and obesity in adolescence increase the chance of obesity in adulthood by up to 80% (4). Epidemiological researches have proved the association of obesity and serious health problems. According to these studies, the incidence of heart attack and sudden death, metabolic disorders, insulin resistance and diabetes, hypertension, hyperlipidemia, coronary heart disease and certain types of cancer are higher in obese individuals (9, 10). Obesity also has adverse effects on adolescents' mental health and has been

shown to affect their self-esteem and the appearance of depressive signs and symptoms, and it is well-known that obesity has led to social exclusion of adolescents (11-13). Most studies have linked the incidence of obesity and the serious problems that follow to the lifestyle of individuals. In fact, lifestyle is one of the most important causes of overweight and obesity (7, 14). Lifestyles are the healthy or unhealthy habits that form during adolescence and extend to adult life (15). Lifestyle risk behaviors, such as poor nutritional regimen, smoking, and physical inactivity are responsible for a large proportion of disease burden and premature mortality worldwide (16). According to a meta-analysis study done by Loeff and Walach those with at least four health behaviors had a 66% reduced risk of all-cause mortality (17).

This is especially important as many studies emphasize the inadequate status of health-promoting lifestyle components in adolescents. In this regard, the results of a US study showed that only 5.8% of adolescents had a good compliance with all health promoting behaviors such as physical activity, healthy eating, non-smoking, etc. (18). A study in South of Iran indicated that health promoting lifestyle was not favorable in high school students, and inactive lifestyle led to a serious problem in the study population (19). Shaping and changing behavior in childhood and adolescence is much easier than in adulthood. In addition, given the possibility of regular contact with adolescents in educational settings, schools can play an active and effective role in promoting their health and should place a strong emphasis on learning to promote a healthy lifestyle (20). World Health Organization (WHO) believes that changing and modifying health-promoting lifestyles can address many serious risk factors, such as overweight and obesity. Overweight or obese are the most

important causes of mortality worldwide and at least 2.8 million people die each year as a result of being overweight or obese (21). Health-promoting behaviors as the most important constituents of a healthy lifestyle, which can play a significant role in preventing and controlling obesity, are fundamentally influenced by the complex interaction of social, economic, and individual factors. In this regard, behavioral science theories provide a systematic explanation and an understanding of the factors influencing such behaviors. Therefore, it is useful to apply behavioral science theories to identify the most important determinants of behavior as a basis for design population-based interventions (22, 23).

Pender's Health Promotion Model has been used to explain healthy behaviors in numerous studies and in different populations such as physical activity (24-26), healthy eating (26-28), oral health-related behaviors (29), and health-promoting behaviors in patients undergoing bypass surgery (30).

To our knowledge, however, this model and its constructs have not been used in explaining health promoting lifestyles in adolescents, especially overweight and obese adolescents. Since any modification of health promoting lifestyle in adolescents requires effective educational interventions, identifying the most important psychological factors influencing the health promoting lifestyle is the first step in this direction. Recognizing these influencing factors will be effective in employing practical ways to modulate health-promoting lifestyle and obesity control. Therefore, this study aimed to compare the status of health promoting lifestyle in overweight and obese adolescents and compare it with adolescents without overweight and obesity using HPM as theoretical framework.

## 2- MATERIALS AND METHODS

### 2-1. Study Design

This was a comparative cross-sectional study conducted in high school students in Deyyer city of Bushehr province, South of Iran. Based on previous studies in this field (31), considering the correlation coefficient value  $r=0.27$  and the first and second type error probability constant values  $\alpha = 0.05$  and  $\beta = 0.1$ , the minimum sample size of 140 for each group (280 in total) was estimated. The multi-stage cluster sampling method was used as a starting point, given that the city of Dayyr has 17 secondary schools (8 for girls, and 9 for boys), 5 girls and 5 boys' high schools were selected randomly.

Proportional to the population of overweight and obese students of each school (Body Mass Index [BMI] above the 85<sup>th</sup> percentile considered as overweight and above 95<sup>th</sup> as obese), the number of obese and overweight students in each school was determined. It should be noted that six months before the start of the study until the beginning of the study, the body mass index of Deyyer students was measured using a standard instrument by the researcher as supervisor. For sampling, at first the list of students' names along with their national ID-number were obtained from selected schools, and then according to the Integrated Health System for each school from each educational level according to the recorded BMI of the students, students with and without overweight and obesity were identified.

Then, from each grade level, proportional to the sample size specified for that grade, the overweight and obese students, and then the same number of students without overweight and obesity were randomly selected. At last, 360 students including 180 obese and overweight students and 180 students without obesity and obesity were selected. Inclusion criteria were checked for each of the selected students

and if they were eligible for inclusion, the aims of the study were explained to them, and after obtaining informed consent, the research questionnaires were completed by interview. Students were assured that there would be no need to write their names and that all information collected from them would be kept confidential. The data collection tool consisted of three sections (demographics, Pender Health Promotion Model constructs and Health Promoting Lifestyle Questionnaire). Due to incomplete completion of the questionnaires by 7 cases of without overweight and obese students, finally, data of 353 students (88 girls and 92 boys with overweight and obesity and 91 girls, 82 boys without overweight and obesity) were analyzed.

## **2-2. Measurements**

### **2-2-1. Sociodemographic Characteristics**

Sociodemographic attributes, including age, gender, father's education, mother's education, father's job, mother's job and family size.

### **2-2-2. Health-Promoting Lifestyle Profile II (HPLP-II)**

A tool designed by Walker et al., was used (32). The questionnaire consisted of 52 items that contained 6 subcategories on nutrition, physical activity, responsibility for health, stress management, interpersonal relationships, and spiritual growth, on a 4-level Likert scale (never, sometimes, often, always). Possible range of the tool was 52-208. This instrument has been translated and psychometrically validated across several linguistic and cultural groups and used in various studies (33-35). The Cronbach's alpha value for this tool is generally 0.94 and for the six subscales ranged from 0.79 to 0.94 (36). In Persian version the Cronbach's alpha value was reported 0.82.

### **2-2-3. HPM Constructs Questionnaire**

This researcher-made questionnaire consisted of Perceived Benefits (14-item), Perceived Barriers (12-item), Perceived Social Support (10-item), and Perceived Self-efficacy (22-item) with a 5-point Likert scale answering option (strongly agree to strongly disagree). Quantitative and qualitative methods were used to assess content validity. In the qualitative review of the content, experts' panel was asked to provide the necessary feedback and modification on the tool. The content validity Ratio (CVR), and content validity index (CVI) were used to examine content validity quantitatively. To do this, 17 specialists in the field of health education and health promotion reviewed the tool and scored each item on the provided checklist. The mean of CVR and CVI for the tool was 0.95 and 0.91, respectively, which was satisfactory. Alpha Cronbach's coefficient was used to measure internal consistency of the instrument. For this purpose, the questionnaire was completed by a pilot study of 30 students who did not participate in the main study. Cronbach's alpha coefficient for perceived benefits, barriers, self-efficacy, and social support were 0.71, 0.75, 0.77, and 0.73, respectively.

### **2-3. Data analysis**

The collected data were analyzed using SPSS software version 22. Pearson correlation coefficient and multiple linear regression model were used to investigate the effects of predictors of health promoting behaviors. Independent t-test was used to compare the quantitative variables between two groups of students with and without overweight and obesity and Chi-square test was used to assess the relationship between qualitative variables and obesity. The significance level of statistical tests was set at 0.05.

## **3- RESULTS**

353 students (180 with overweight and obesity and 173 without overweight and

obesity students) participated in this study. Almost half of the participants (50.7%) were girls and 49.3% were boys. The mean age of students with overweight and obesity was  $15.19 \pm 1.53$  and in students without overweight and obesity was  $15.15 \pm 1.46$ . The mean of family size in students with and without overweight and obesity were  $4.59 \pm 1.05$  and  $4.84 \pm 1.19$ , respectively. Parent education level of most students in both students with overweight and obesity (53.9%), and

without overweight and obesity (58.4%) was high school and their job (63.3% in overweight and obese students, 64.7% in students without overweight and obesity) was self-employed. Most of the students' mothers (92.2% in overweight and obese students, and 89.6% in students without overweight and obesity) were housewife. There was a significant difference between the two groups in terms of family size ( $p=0.037$ ), while this difference was not significant in the other variables.

**Table-1:** Baseline characteristics in two groups of students with and without overweight and obesity (n=353).

Variables	With overweight and obesity		Without overweight and obesity		P-value
	Number	%	Number	%	
Gender					
Female	88	48.9	91	52.6	0.486
Male	92	51.1	82	47.4	
Father's job					
Unemployed	9	5.1	4	2.3	0.309
Employee	47	26.9	46	26.8	
Self-employment	114	65.1	112	65.1	
Retired	5	2.9	10	5.8	
Mother's job					
Housewife	166	92.2	155	90.1	0.045
Employee	14	7.8	17	9.9	
Father's education					
Illiterate	4	2.2	7	4.1	0.126
Elementary	34	19	18	10.5	
Middle/High school	97	54.2	101	58.7	
College education	44	24.6	46	26.7	
Mother's education					
Illiterate	5	2.8	7	4	0.550
Elementary	36	20	31	17.9	
Middle/ High school	118	65.6	107	61.8	
College education	21	11.7	28	16.2	
Mean and SD					
Age	15.19	1.53	15.15	1.46	0.809
Family size	4.59	1.05	4.84	1.19	0.037

SD: Standard deviation.

Study findings revealed that the mean and the standard deviation (SD) of the total score of health-promoting behaviors were  $145.77 \pm 26.16$  and  $136.67 \pm 27.79$  among with and without overweight and obesity students respectively, (possible range was

52-208). Based on the results, adherence to all health promoting behaviors, except interpersonal relationships, was better in students without overweight and obesity than in students with overweight and obesity. (**Table-2**).

**Table-2:** Health promoting behaviors in two groups of students with and without overweight and obesity, n=353).

Health Promotion Behaviors	Group	Lowest score	Highest score	Mean	SD	Possible range	P-value
Spiritual growth	without overweight and obesity	11	36	28.37	5.097	11-44	0.029
	with overweight and obesity	9	36	27.07	5.981		
Health-responsibility	without overweight and obesity	9	36	23.29	5.829	13-52	0.025
	with overweight and obesity	10	36	21.85	6.217		
Interpersonal relationships	without overweight and obesity	14	36	25.93	5.152	8-32	0.147
	with overweight and obesity	9	54	25.07	5.932		
Stress-management	without overweight and obesity	10	32	21.47	4.999	6-24	0.002
	with overweight and obesity	10	32	19.83	4.817		
Physical activity	without overweight and obesity	8	32	20.90	5.460	7-28	0.001
	with overweight and obesity	8	32	18.94	5.649		
Nutrition	without overweight and obesity	13	36	25.74	5.302	7-28	0.003
	with overweight and obesity	10	36	24.01	5.694		
Health-promoting lifestyle (Total)	without overweight and obesity	72	208	145.77	26.163	52-208	0.002
	with overweight and obesity	77	208	136.67	27.791		

SD: Standard deviation.

Results of Pearson correlation analysis of Health promoting behaviors with HPM constructs in two groups are presented in **Table.3**. Based on this data, there was a significant positive correlation between all aspects of health promoting behaviors with perceived benefits, self-efficacy and social support in both groups ( $p < 0.001$ ). There was a significant negative correlation between Health promoting behaviors and perceived barriers ( $p < 0.001$ ) in both groups. This means that all of the students who reported higher self-efficacy, perceived benefits and social support, had higher health promoting behaviors. In addition, students who reported lower perceived barriers had better health promoting behaviors. Based on the results

of stepwise regression analysis, in the final model for overweight and obese students, self-efficacy, perceived barriers and family size had a significant effect on adherence to health promoting behaviors. The mean score of health promoting behaviors was increased by 0.47 ( $p = 0.017$ ) with decreasing one-unit score of perceived barriers with controlling for other variables in the model. Concerning perceived self-efficacy, by increasing one score of this construct and with controlling for other variables, the score of health promoting behaviors was increased 0.30 ( $p = 0.046$ ). The mean score of health promoting behaviors increased by 4.29 points as one person increased the number of family members (**Table.4**).

**Table-3:** The Correlation of Health promoting behaviors and HPM constructs in two groups of students with and without overweight and obesity, n=353).

HPM Construct		Perceived benefits	Perceived barriers	Perceived Self efficacy	Perceived social support
Health Promotion Behaviors	Group				
Spiritual growth	with overweight and obesity	0.431*	-0.480*	0.402*	0.527*
	without overweight and obesity	0.421*	-0.392*	0.506*	0.346*
Health-responsibility	with overweight and obesity	0.439*	-0.382*	0.482*	0.475*
	without overweight and obesity	0.356*	-0.300*	0.488*	0.470*
Interpersonal relationships	with overweight and obesity	0.350*	-0.375*	0.381*	0.450*
	without overweight and obesity	0.382*	-0.313*	0.435*	0.468*
Stress-management	with overweight and obesity	0.439*	-0.443*	0.536*	0.438*
	without overweight and obesity	0.415*	-0.346*	0.530*	0.383*
Physical activity	with overweight and obesity	0.324*	-0.321*	0.415*	0.377*
	without overweight and obesity	0.295*	-0.325*	0.520*	0.338*
Nutrition behavior	with overweight and obesity	0.420*	-0.338*	0.485*	0.465*
	without overweight and obesity	0.374*	-0.318*	0.444*	0.347*
Health Promotion Behaviors (Total)	with overweight and obesity	0.496*	-0.482*	0.554*	0.566*
	without overweight and obesity	0.454*	-0.405*	0.596*	0.481*

\*\*Correlation is significant at the 0.001 level (two-tailed).

**Table-4:** The final model of predictors of HPM constructs on health promoting behaviors among overweight and obese students based on regression model.

Variables	Regression coefficient	Standardized regression coefficient	Standard Error	P-value
Gender				
female	Referent	Referent	Referent	
male	0.521	0.010	3.382	0.878
Age	-0.652	-0.037	1.095	0.553
Father's job				
Unemployed	Referent	Referent	Referent	
Self-employment	11.142	0.244	7.559	0.142
Employee	12.500	0.125	8.008	0.121
Retired	11.810	0.443	12.214	0.335
Mother's job				
Housewife	Referent	Referent	Referent	
Employee	-3.900	-1.234	6.337	0.539
Family size	4.293	1.715	1.637	0.010
Perceived benefits	0.357	0.239	0.276	0.197
Perceived barriers	-0.471	-0.162	0.196	0.017
Perceived self-efficacy	0.308	0.006	0.154	0.046
Perceived social support	0.609	0.034	0.315	0.055

In the final predictive model by stepwise method for students without overweight and obesity, only perceived self-efficacy had a significant effect on health promoting behaviors ( $p < 0.001$ ). That is, the mean score of health promoting behaviors in these students increased by 0.75 points with one unit increase in perceived self-efficacy with controlling for

other variables in the model. Other constructs of HPM did not predict the health promotion behaviors of students without overweight and obesity. Among demographic variables, family size had a significant effect on health promotion behaviors of overweight and obese students (**Table.5**).

**Table-5:** The final model of predictors of HPM constructs on health promoting behaviors among students without overweight and obesity based on regression model.

Variables	regression coefficient	Standardized regression coefficient	Standard Error	P-value
Gender				
female	Referent	Referent	Referent	
male	2.922	0.056	3.453	0.399
Age	-0.228	-0.015	1.001	0.820
Father's job				
Unemployed	Referent	Referent	Referent	
Self-employment	3.807	0.090	12.701	0.765
Employee	2.886	0.032	13.070	0.826
Retired	8.837	0.394	14.770	0.551
Mother's job				
Housewife	Referent	Referent	Referent	
Employee	-5.206	-1.389	5.920	0.381
Family size	0.492	0.171	1.495	0.743
Perceived benefits	0.356	0.190	0.342	0.299
Perceived barriers	-0.229	-0.072	0.228	0.317
Perceived self-efficacy	0.754	0.014	0.179	<0.001
Perceived social support	0.484	0.031	0.272	0.077

#### 4- DISCUSSION

The purpose of this study was to compare the predictors of health promoting lifestyle behaviors based on Pender Health Promotion Model among students with and without overweight and obesity. According to the results, the status of health promoting behaviors was moderate in both students with and without overweight and obesity, but the adherence to these behaviors was different in the two groups. Students without overweight and obesity performed more health promoting behaviors in general and across all domains except interpersonal relationships than students with overweight and obesity. In fact, healthy eating behaviors, physical

activity, stress management, responsibility for health, and spiritual growth were better in students who did not have overweight and obesity, and perhaps having a normal weight could be a result of such better adherence to health-promoting behaviors. Lower BMI and having a normal weight in other studies were also associated with health-promoting behaviors (37). Consistent with the results of the present study, Piri et al. found that normal-weight students had better adherence to health-promoting behaviors including healthy eating and physical activity (38). According to the results of the present study, overweight and obese students had less stress management, whereas studies claim that overweight and obese people are

facing more stress (39), and also the presence of stressors can be a factor for worsening overweight problems (40). Therefore, stress management techniques and adherence to this domain of health promoting behaviors can be effective in improving weight management in people. In other studies, teaching stress management techniques and performing stress management techniques leads to lower BMI (41). Also, spiritual health can affect the physical and mental health of individuals, even in terms of obesity and having a normal BMI (42), which is in line with the findings of the present study.

Other results showed that among demographic variables in overweight and obese students, number of family members was associated with adherence to health promoting behaviors and this factor was predictive of health promoting behaviors in this group of students. Accordingly, adherence to health-promoting behaviors in overweight and obese students who had more family members was better. Consistent with the results of the present study, Tol and colleagues also found that the household dimension was associated with some health promoting behaviors such as physical activity (43). Contrary to these results, in the study of Motaghi et al., the number of brothers of the study subjects was inversely associated with health promoting behaviors (44).

In a study by Piri et al. (38), girl students in smaller families had better health-promoting behaviors. In some studies, there was no significant relationship between health promoting behaviors and household dimension (45). These inconsistencies may be due to cultural differences in different populations under study. Based on the results of this study, it seems that in families with larger populations, the student's sibling could be their playmates and improve the physical activity and interpersonal relationships as health promoting behavior dimensions,

and also, they have the potential for being role models for healthy behaviors. In the other hand, small-sized families and especially single-child families can lead the child to choose those kinds of leisure time activities that are more inactive, such as playing video games and cyberspace activities. These lifestyle behaviors had so many consequences on all aspects of life and health status of the student. However, because of inconsistencies in this area, further studies are recommended with more focus on this issue in this population in different regions. Other results showed that all constructs of HPM were associated with health promoting lifestyle behaviors in both students with and without overweight and obesity. In both groups, students with more perceived benefits, self-efficacy, social support and those with less perceived barriers reported better health-promoting lifestyles.

Consistent with the results of the present study, in other studies, better self-efficacy was associated with healthy lifestyle behaviors in Indian working women (46), Iranian health workers (47), and mothers of children with chronic diseases (48). Perceived social support was also associated with better adherence to healthy lifestyle behaviors in a Korean study (49). In the study of Lim et al., perceived benefits were the most important factor related to health promoting behaviors (50).

Less perceived barriers were associated with better adherence to healthy eating behaviors among students (51). A study in Indonesia also found that in addition to high self-efficacy, higher social support and lower perceived barriers could lead to better adherence to health promoting behaviors in hypertensive patients (52). According to other results, although all constructs of HPM were associated with health promoting lifestyle, in the regression model and in the presence of other variables, among students with overweight and obesity, perceived barriers

and perceived self-efficacy, and in the students without overweight and obesity, only perceived self-efficacy were predictors of healthy lifestyle. It seems that the overweight and obese students face more problems and barriers in the way of performing health promoting lifestyle that may require more self-efficacy to overcome the barriers. However, for students without overweight and obesity, belief in the ability to perform (self-efficacy) health promoting behaviors plays the most important role in prediction of performing these behaviors. Students with overweight and obesity may face many barriers to perform health promoting behaviors, which are found in many studies consistent with the results of the present study. These barriers may be lack of willpower, awareness, and skills, time, resources, and inappropriate weather condition of the living place (53).

Since, perceived self-efficacy of individuals empowers them to overcome barriers, in several studies in line with the results of the present study, this construct was an important factor in individuals' adherence to health-promoting behaviors (54, 55). Self-efficacy was also the most significant predictor of health-promoting behaviors in students without overweight and obesity. This means that they rely more on their personal abilities to lead a healthy lifestyle and if they believe they can, they will follow health-promoting behaviors. Therefore, in order to improve the health promotion lifestyle of overweight and obese students, identifying barriers, providing solutions to these barriers, and empowering them to overcome barriers in the path of adherence to health promoting behaviors should be considered. Students without overweight and obesity will also benefit from designing educational interventions and using self-efficacy improvement strategies such as mastery experiences, vicarious experiences and verbal persuasion.

#### **4-1. Study Limitations**

Health-promoting behaviors were evaluated with self-report, so this study's data may be subject to recall bias or memory failure. The results reported in the study were obtained from a cross-sectional survey and no causality is established between HPM components and health promoting behaviors.

#### **5- CONCLUSION**

According to the results of this study, health-promoting behaviors in students were generally moderate and adherence to these behaviors in overweight and obese students was lower than in non-overweight and obese students. The most important factors affecting healthy lifestyle among students without overweight and obesity were self-efficacy and in students with overweight and obesity, in addition to self-efficacy, perceived barriers also played a decisive role. Therefore, based on these results, it is necessary to design educational interventions for behavior modification in two groups and attention to each of the known factors in each group is necessary for designing effective educational interventions.

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#### **7- CONFLICT OF INTEREST: None.**

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