

## Perceived Barriers to Recommended Diet and Physical Activity Patterns among Ethnically Diverse Middle School Students

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### Abstract

The purpose of this cross-sectional, descriptive study was to examine perceived barriers to the adoption of recommended dietary and physical activity behaviors in low income ethnically diverse middle school students. Respondents completed surveys in sixth and eighth grade (n=289): 37% (n=100) of whom were Hmong, 34% (n=92) White, and 18% (n=57) Non-Asian, Non-White (NANW). Chi square and ANOVA were used to test the hypothesis that there were significant differences in perceived barriers for the adoption of recommended dietary and physical activity behaviors among ethnic groups. At 46%, significantly more Hmong versus White (12%) and NANW (16%) students indicated that cost was a significant barrier to fruit and vegetable availability at home (p=.001). In addition, 51% of Hmong students versus 33% of White and 34% of NANW students indicated that peer pressure was a barrier to the consumption of fruits and vegetables (p=.002). At 33%, significantly fewer Hmong students reported meeting the guidelines for physical activity compared to White students (52%, p=.016). Furthermore, Hmong students believed that being physically active every day was less important to their family members compared to non-Hmong students (p=.004). These results indicate that there is a need for culturally specific nutrition education and physical activity promotion with a particular focus on reducing obstacles to the adoption of recommended dietary patterns and physical activity for Hmong middle school students.

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*Keywords: Hmong, barriers, diet, physical activity*

### Introduction

Child and teen overweight rates have reached epidemic proportions over the past twenty years. The 1999-2002 National Health and Nutrition Examination Survey states that 31% of children ages 6-19 years old are either at risk for overweight or overweight (CDC, 2002). Current research indicates that 25% of children in the United States are at risk of overweight (BMI > 85th percentile), while 11% are overweight (BMI > 95th percentile) (Nicklas, Yang, Baranowski, Zakeri, Berenson, 2003). Researchers have found that fruit and vegetable consumption is inversely related to adolescents' body mass index (Lin and Morrison, 2002). However, in spite of the importance of adequate fruit and vegetable intakes, studies have shown that youth fall well below the recommended daily servings. Insufficient physical activity is also a risk factor for higher body mass index

(BMI) for adolescent boys and girls based on research on 878 minority adolescents (Patrick, Norman, Calfas, Sallis, Zabinski, Rupp et al., 2004). The 2005 Youth Risk Behavior Surveillance Survey results indicate that only 36% of American high school students participate in at least 60 minutes per day of physical activity on a regular basis (CDC, 2006). Moreover, recent data from the National Health and Nutrition Examination Survey (NHANES) indicate that 33% of American teenagers are unfit and that this is setting the stage for health problems later in life (Carnethon, Gulati, Greenland, 2005). Thus, many adolescents tend to engage in unhealthy behaviors that lead to the increased risk of developing related chronic diseases.

According to CDC (2002), ethnically diverse populations are at greater risk of becoming

overweight or obese than the White population (Hedley, Ogden, Johnson, Carroll, Curtin, Flegal, 2004). With regard to child obesity, Asians have the fastest growing rate of overweight children. While the rate of overweight for Asian school age students is currently below the mean for U.S. youth, the rate at which overweight is increasing among Asian youth is faster than the rate for non-Asian U. S. youth (Harrison, Kagawa-Singer, Foerster, Lee, Kim, Fernandez-Ami et al., 2005).

Acculturation to the U. S. mainstream culture has been recognized as a risk factor for unhealthy behaviors among ethnic minority adolescents, including Asians. Acculturation to the typical U. S. diet is generally associated with a shift from a traditional diet rich in fruits, vegetables, whole grains and meats to a more processed diet high in fat and sugar. For example, immigrants or refugees typically increase consumption of fat, processed meats, snack foods, between-meal snacks and fast-food, and decrease consumption of fish, vegetables, and whole grains (Kaplan, Zabkiewicz, McPhee, Nguyen, Gregorich, Disogra et al., 2003; Unger, Reynolds, Shakib, Spruijt-Metz, Sun, Johnson, 2004). Furthermore, after surveying 6th and 7th grade Hispanic and Asian American students in Southern California, Unger and colleagues (2004) found that acculturation to the U. S. lifestyle was associated with a higher frequency of fast food consumption and a lower frequency of physical activity.

There is currently limited research on barriers to the adoption of health promoting dietary and physical activity behaviors. There is also limited research on the affects of acculturation on dietary and physical activity habits for the growing population of Hmong students, virtually all of whom are either refugees themselves or the children of refugee parents. Therefore, the purpose of this study was to examine perceived barriers to the adoption of recommended dietary and physical activity behaviors in low-income ethnically diverse middle school students in a rural county in Northern California. It was hypothesized that there would be significant differences in perceived barriers to the adoption of recommended dietary and physical activity

behaviors between Hmong and White middle school students. Study findings will be used to design nutrition education and physical activity school based promotion interventions to help mitigate the rapid increase in the rate of overweight among Hmong youth.

## **Methods**

### **Subjects and Method of Selection**

This research was a cross-sectional, descriptive study. Participants consisted of all sixth and eighth grade students (n= 289) enrolled in a low income school in rural Northern California. Forty five percent (n=164) of the schools' 521 total students were Asian Americans, specifically of the Hmong ethnicity. The majority of the remaining students were Caucasian. School administrators requested that seventh graders be excluded from this study as they were completing a separate district mandated California Healthy Kids Survey. This study was approved by the California State University, Chico Human Subjects Review Committee in spring 2006.

### **Study Questionnaire**

The study questionnaire consisted of 43 questions/statements focused on student's fruit and vegetable intake, soda or other sweetened beverage and caffeinated beverage consumption, physical activity and inactivity patterns, and barriers both to the consumption of fruits and vegetables and physical activity. The questionnaire contained Likert statements pertaining to students' adherence to dietary and physical activity guidelines as well as statements addressing their own perceived adherence and their interpretation of their family members' and friend's adherence to general dietary and physical activity guidelines. There were also Likert statements on the student's belief in the importance of regular physical activity and consuming a healthy diet and the student's perception of barriers affecting the adoption of recommended dietary and physical activity guidelines. Demographic information (e.g., age, gender, and ethnicity) was also requested. An acculturation score was computed by combining the scores of the following four questions: "The holidays I celebrate are mostly from," "The food I eat at home is mostly from," "What language

do you speak at home,” and “Where were you born”. The scores ranged from one to five, with one indicating least acculturated and five most acculturated.

The questionnaire was field tested for face and content validity and refined based on the results of the field test. The questionnaire was administered by trained professionals to sixth grade students during science and social studies classes and during science classes for eighth grade students. All participating students were required to have parental consent and were informed that participation was voluntary.

### Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences version 13.0 (SPSS, 2005). Descriptive statistics are presented as counts, percentages, means, and standard deviations. Pearson’s correlation coefficient was used to explore associations between dietary and physical activity behaviors and attitudes. Analysis of variance (ANOVA) and t-tests were used to test for statistically significant differences in fruit and vegetable consumption, physical activity levels and perceived dietary and physical activity barriers between ethnic groups, gender, and grade levels. Chi-square was used to assess the differences in diet, physical activity, and barrier variables between ethnic and level of acculturation groups.

When comparing ethnicities, the Latino (n=28), African American (n=11), Native American (n=17), and other students (n=1) were combined into one group titled non-Asian, non-White students because there were no statistically significant differences between these ethnic groups for all study variables. Because there were no statistically significant differences in dietary variables between Hmong (n=100) and non-Hmong Asian students (n=19), these two ethnicities were combined into the variable, Asian students, for diet related statistical tests only. Statistical significance was established at  $p \leq .05$ .

### Results

Table 1 presents the demographic characteristics of the sixth and eighth grade students. Fifty two percent (n=145) were male and 48% (n=135) were female. The ethnic characteristics of the sample were as follows: 37% (n=100) Hmong, 4% (n=10) Iu-Mien, 4% (n=9) other Asian, 6% (n=17) Native American, 10% (n=28) Latino, 4% (n=11) African American, and 34% (n=92) White. Fifty-four percent (n=155) of the participants were in eighth grade and 46% (n=134) were in sixth grade. The mean acculturation score for the Hmong, Iu-Mien, and other Asian students was  $3.0 \pm 1.0$  indicating a moderate level of acculturation on this five point scale.

The average student reported eating fruit  $2.2 \pm 1.7$  times per day with 57% (n=163) meeting or exceeding the dietary recommendations for fruit for the 24 hours prior to the survey. The average student reported eating vegetables  $2.0 \pm 1.6$  times per day with only 35% (n=99) meeting the dietary recommendations for vegetables during the 24 hours prior to the survey. Reported fruit and vegetable consumption patterns did not differ significantly between Hmong and White students.

The average number of soda or other sweetened beverages consumed was  $1.4 \pm 1.3$  per day and the average number of caffeinated beverages was  $1.3 \pm 1.3$  per day, indicating that virtually all sodas and sweetened beverages were caffeinated. There were significant differences in soda and sweetened beverage ( $p=0.019$ ) and caffeinated beverage ( $p=0.033$ ) consumption between Asian (Hmong, Iu-Mien, and other Asian students) and non-Asian students. Asian students reported consuming approximately one-half a serving less per day than non-Asian students of each type of beverage.

Only 43% (n=124) of the students indicated that they were physically active for the recommended level of at least 60 minutes or more a day. The students’ average time spent in front of the television was  $2.5 \pm 1.5$  hours per day. Fifty-eight percent (n=165) of the students indicated that they watched two hours or more of television in the 24 hours prior to the survey.

Table 1  
Demographic characteristics of students (n=289)

Characteristics	n	Percent	Mean ± SD
Age			12.6 ± 1.1
Gender			
Male	145	52	
Female	135	48	
Grade			
6th	134	46	
8th	155	54	
Ethnicity			
Hmong	100	37	
Iu-Mien	10	4	
Other Asian	9	4	
Native American	17	6	
Latino	28	10	
African American	11	4	
White	92	34	
Other	1	1	
Acculturation Score for Asian Students			3.0 ± 1.0
Least acculturated	10	9	
Less acculturated	19	17	
Moderately acculturated	48	43	
More acculturated	30	27	
Most acculturated	4	4	

**Barriers to the adoption of fruit and vegetable recommendations**

Table 2 shows barriers to consumption of fruits and vegetables by ethnic group. Approximately half (46%, n=54) of the Asian students versus 12% of the White and 16% of the non-Asian, non-White students indicated that cost was a significant barrier to fruit and vegetable availability at home (p=.001). While not statistically significant, less acculturated Asian students were more likely to agree with the statement that fruits and vegetables cost too much to purchase versus more acculturated Asian students (p=.126).

Table 2 also presents the opinion of friends as a barrier to the consumption of fruits and vegetables. Half (51%, n=58) of the Asian students versus a third of both the White (33%, n=20) and non-Asian, non-White (34%, n=18) students indicated that if they ate fruits and vegetables, their friends would criticize or make fun of them (p=.002). Responses to this statement also differed significantly by gender, such that male (2.3±1.2) students were more likely to agree with the statement than female students (2.0±1.0, p=.03).

Table 2  
Barriers to consumption of fruits and vegetables by ethnic group

Barriers	Ethnic Group							
	Asian*		White		NANW <sup>a</sup>		Total	
	n	%	n	%	n	%	n	%
Fruits and vegetables cost too much for my family to buy often.								
Disagree	64	54	80	88	48	84	208	72
Agree	54	46	10	12	9	16	79	28
My friends will make fun of me if I eat fruits or vegetables.								
Disagree	56	49	68	77	36	66	170	62
Agree	58	51	20	33	18	34	104	38

<sup>a</sup>Non-Asian, Non-White (NANW) group consists of African American, Native American, and Latino ethnicities.

\*Asian responses were significantly different from the other two ethnic groups (p<.001).

Reponses to the Likert belief statement that the consumption of adequate amounts of fruits and vegetables would help with classroom performance differed significantly between sixth and eighth grade students, such that sixth grade students (3.8±1.0) were more likely to agree with the statement than eighth grade students (3.5±1.0, p=.033). The belief that fruits and vegetables would help control weight also differed by grade, such that sixth graders (4.2±1.0) were more likely to agree with the statement than eighth graders (3.7±1.1, p=.001). These high Likert scores indicate fairly pervasive agreement, especially among sixth graders, with the belief that fruits and vegetables will assist with weight control. The belief that friends would criticize or make fun of them for eating fruits and vegetables also differed significantly by grade, such that sixth grade students (2.4±1.2) were less likely to disagree with the statement than eighth grade students (1.9±1.2, p=.003). In addition, fruit consumption differed significantly between sixth and eighth graders, in that sixth grade students reported eating one serving more of fruit in the past 24 hours (2.7±1.7) than eighth grade students (1.7±1.5, p=.001).

**Barriers to the adoption of physical activity recommendations**

As shown in Table 3, there were significant differences in physical activity patterns by ethnic groups such that only 33% of Asian

students reported meeting the guidelines for physical activity compared to 52% of White students and 43% of non-Asian, non-White students (p=.016). Responses to the statement, “Kids my age need \_\_ minutes of physical activity a day,” differed significantly by ethnic group, such that significantly fewer Asian students (21%, n=24) appear to have knowledge of the national guidelines for physical activity of ≥ 60 minutes per day when compared to White (42%, n=39) and non-Asian, non-White students (33%, n=18, p=.001). Responses to the statement, “During the last week, I was physically active for at least one hour a day,” also differed significantly by ethnic group, such that only 62% (n=70) of Asian students agreed with the statement compared to 77% of White students (n=69) and 71% of non-Asian, and non-White students (n=39, p=.001). In addition, responses to the statement, “It is important to me to be physically active at least one hour each day,” differed significantly by ethnic group, such that significantly fewer Asian (74%, n=89) students agreed with the statement compared to White students (84%, n=77) and non-Asian, non-White students (86%, n=49, p=.001). Also, responses the statement, “It is hard to find a physical activity that is fun to do after school,” differed by ethnic group such that at 37% (n=43), significantly more Asian students agreed with the statement compared to only 23% of the White (n=21) and 29% (n=16) of the non-Asian, non-White students (p=.002).

Table 3  
Physical activity characteristics by ethnic group (n=289)

Physical activity characteristics	Ethnic Group							
	Asian*		White		NANW <sup>a</sup>		Total	
	N	%	n	%	n	%	n	%
I get about ___ minutes/day								
<60 minutes	80	67	44	48	32	57	165	58
≥60 minutes	39	33	48	52	25	43	124	42
Kids my age need ___ minutes/day								
<60 minutes	92	79	53	58	37	67	193	68
≥60 minutes	24	21	39	42	18	33	91	32
I was physically active for at least one hour/day over the last week								
Disagree	19	17	12	13	6	11	39	14
No opinion	23	21	9	10	10	18	44	16
Agree	70	62	69	77	39	71	193	70
It is important to me to be physically active at least one hour/day								
Disagree	8	7	4	4	5	9	17	6
No opinion	22	19	11	12	3	5	36	13
Agree	89	74	77	84	49	86	236	82
It's hard to find a physical activity that's fun to do after school								
Disagree	44	37	60	67	33	60	147	52
No opinion	30	26	9	10	6	11	49	17
Agree	43	37	21	23	16	29	86	31

<sup>a</sup> Non-Asian, Non-White group consists of African American, Native American, and Latino ethnicities.

\*Asian responses were significantly different from other two ethnic groups for all physical activity characteristics.

There were significant differences in physical activity patterns by gender in that only 36% (n=48) of female students reported meeting the guideline for daily physical activity compared to 49% (n=71) of males (p=.04). A similar finding was found for the statement, “I was physically active for at least one hour a day,” in that female students (3.7±1.2) were less likely to agree with the statement compared to the male students (4.1±1.0, p=.004). Females also showed less awareness of the guidelines for physical activity in that only 23% correctly responded to the statement, “Kids my age need \_\_\_ minutes of physical activity a day” verses 38% of male students.

In contrast to dietary variables, there were significant differences in physical activity beliefs between Hmong (n=100) and non-

Hmong Asian (n=19) students. Therefore, the responses to the physical activity survey items for the non-Hmong Asian students were combined with the Latino, Native American, and African American students. This ethnic grouping was titled non-Hmong, non-White (NHNW) students and was used for statistical tests when analyzing responses to the physical activity belief statements as shown in Table 4. Students’ responses to the belief statement regarding the perception of family members toward daily physical activity differ significantly by ethnic group in that only 74% (n=73) of Hmong students indicated that people in their family thought that daily physical activity is “a good thing” compared to 87% (n=80) of White and 88% of the non-Hmong, non-White students (n=65, p=.004).

Table 4  
Physical activity beliefs by ethnic group

Students' Physical Activity Beliefs	Ethnic Group							
	Hmong*		White		NHNW <sup>a</sup>		Total	
	n	%	n	%	n	%	n	%
Most people in my family think that being physically active each day is:								
A good thing	73	74	80	87	65	88	170	61
Not important	25	26	12	13	9	12	111	39
If I were physically active on most days, I will become stronger:								
Disagree	24	25	7	8	4	5	36	13
Agree	74	75	82	92	70	95	244	87
Physical activity will help control my weight:								
Disagree	24	25	8	9	10	14	47	17
Agree	71	75	81	91	62	86	228	83
If I were physically active on most days, my friends will criticize or make fun of me:								
Disagree	46	50	72	84	49	70	177	67
No opinion	39	41	7	8	10	15	59	22
Agree	8	9	7	8	10	15	29	11

<sup>a</sup> Non-Hmong, Non-White (NHNW) consists of the Iu-Mien, other Asian, African American, Native American, and Latino ethnicities.

\*Hmong responses are significantly different from other ethnic groups for all variables (p<.01).

Responses to the belief statement, “If I were physically active on most days, I will become stronger,” differ by ethnic group such that only 75% (n=74) of Hmong students agree with the statement compared to 92% (n=82) of White and 95% of the non-Hmong, non-White students (n=70; p=.001). Also, responses to the belief statement that physical activity “will help control my weight,” differ by ethnic group, such that 75% (n=71) of Hmong students agree with the statement compared to 91% (n=81) of White students and 86% of non-Hmong, non-White students (n=62, p=.004). Furthermore, responses to the belief statement, “If I were physically active on most days my friends will criticize or make fun of me,” differ among ethnic groups. Only 50% (n=46) of Hmong students disagreed with the statement compared to 84% (n=72) of White and 70% non-Hmong, non-White students (n=49, p=.001). Differences for this physical activity variable also existed between sixth and eighth grade students in that sixth grade students were significantly more likely to disagree with

the statement that their friends would make fun of them compared to eighth grade students (p=.002).

### Discussion

This study examined perceived barriers to the adoption of recommended dietary and physical activity behaviors in ethnically diverse middle school students. To our knowledge, this is the first study systematically examining barriers specific to Hmong middle school students for the purpose of designing ethnically specific school based strategies to promote fruit and vegetable consumption and physical activity for this population.

#### Barriers to the adoption of fruit and vegetable recommendations

Our finding that 57% and 35% of the students were meeting or exceeding the daily recommendations for fruit and vegetables, respectively, is higher than the previous findings by Project EAT of 45% and 17%, respectively,

for children meeting the guidelines (Neumark-Sztainer, Wall, Perry, Story, 2003). This difference may be due to the different methods of assessing dietary intake. Study results provide evidence that among the study sample, Asian students are consuming less soda or other sweetened beverages and caffeinated beverages per day than the non-Asian middle school students. Although they are consuming less, at 1.2 servings of soda vs. less than one serving of soda per day, Asian students from the present study are still consuming more than Asian middle school students in Southern California, respectively (Giammattei, Blix, Marshak, Wollitzer, Pettitt, 2003).

A significant number of Asian students indicated that cost was a barrier to the consumption of fruits and vegetables. Although not a statistically significant finding, Asian students reporting a higher level of acculturation tended to have lower rates of agreement with the Likert statement that cost was a barrier. Further research is needed to examine the mechanism by which acculturation of children and their parents' affects perceptions of fruit and vegetable consumption. A low level of acculturation of immigrant mothers has been identified as a factor associated with higher rates of child obesity. Chen and Kennedy (2005) found that Chinese children in immigrant families whose mothers were less acculturated had a higher body weight than those whose mothers were more acculturated. These researchers hypothesize that lack of social support and access to health and nutrition services are contributing factors. With regard to the sample for the present study, it may be that more acculturated mothers and their children may have more access to nutrition services (e.g., WIC), which may result in fewer perceived barriers to the consumption of fruits and vegetables.

Prior research indicates that children are influenced by their perception of their peers' attitudes and behaviors toward the consumption of fruits and vegetables (Vareecken, Van Damme, Maes, 2005). This finding is supported by the current study, as half (51%) of the Asian middle school students agreed that their friends

would criticize or make fun of them for eating fruits and vegetables. Hence, the negative opinion of friends appears to be a significant barrier to the consumption of fruits and vegetables for these Asian students. In addition, male students were significantly more likely to agree with the statement that their friends would criticize or make fun of them for eating fruits and vegetables compared to female students for all ethnic groups. This finding is supported by the results of the 2004 California 5-a-Day Benchmark Campaign Survey, which showed that males were more likely to agree with the statement than females (Bye, O'Connor, Barry, 2004).

Additional findings from the 2004 California 5-a-Day Benchmark Campaign Survey indicated that Hmong students demonstrated a stronger desire than Cambodian or Vietnamese students to adopt American food preferences and practices, especially the consumption of soda (Bye, O'Connor, Barry, 2004). With regard to the present study, the Hmong middle school students in our Northern California sample appear to be consuming more soda than Asian students from other areas in California (Giammattei, et al., 2003). As alternative explanations to these differences in soda consumption, it may be that the rate of soda consumption has increased for Hmong youth in general since 2003, or that level of acculturation is associated with soda consumption and that differences in acculturation exist between the different geographical locations for these two studies.

#### **Barriers to the adoption of physical activity recommendations**

Overall, only 43% of study participants were active for at least one hour a day. Asian students were consistently less aware than their non-Asian counterparts of the physical activity guidelines and only one-third of the Asian students from these refugee families met the guidelines for daily physical activity. Physical activity scores for female students, in general, and Asian females, in particular, were lower than males for physical activity related variables. This finding is in concurrence with previous findings among minority adolescents indicating

that physical activity status is lowest in Asian females (Gordon-Larsen, McMurray, Popkin, 1999).

Findings from the current study provide evidence of ethnic differences in family support for physical activity. Hmong students believe that it is less important to their family members to be physically active every day compared to non-Hmong students. This purported belief by family members may lead to both a decrease in the frequency of opportunities for physical activity, as well as a decrease in family based incentives for physical activity among these Hmong middle school students. Findings from the present study appear to be supported by previous research showing that Asian American adults are less likely to meet the recommended levels of physical activity if only “leisure time physical activity”, meaning physical activity done any time other than that associated with one’s occupation, is considered (Kandula and Lauderdale, 2005). If physical activity (e.g., leisure time exercise or physical activity after school) is not valued by parents, the presumed outcome would be less physical activity after school for children. It is unknown whether more acculturated Hmong parents are more aware of the importance of leisure time physical activity than less acculturated Hmong parents.

### **Limitations**

Study results are limited to the accuracy of the students’ self reports of their adherence to the dietary and physical activity recommendations and their answers to the questions of their beliefs regarding the barriers and benefits of fruits, vegetables, and physical activity. Further research is needed to evaluate the accuracy of the adolescents’ self-reports across ethnic groups. Second, this sample of Northern

California middle school students might not be representative of the general population of low income Hmong, White, and non-Asian, non-White students. The participants in this study were adolescents attending a low resource rural middle school. Further research is needed to assess whether the differences found in this study among ethnic groups can be applied to other groups of similar students. Finally, the sample size may have been too small to detect significant effects of level of acculturation on dietary and physical activity attitudes and behaviors among Hmong students.

### **Conclusion**

In conclusion, study results supported the hypothesis there are significant differences in perceived barriers to the adoption of dietary and physical activity recommendations between Hmong and White students. Underlying factors that contribute to these perceived barriers, however, are still unknown. Our study also revealed the complexity of acculturation effects on perceived barriers to the adoption of dietary and physical activity guidelines among Hmong and Iu-Mien middle school students. Because study findings substantiate the importance of family support for the promotion of healthy eating and physical activity patterns, it is imperative to examine the perspectives of these children’s parents on barriers to and opportunities for the promotion of healthful eating and physical activity. Finally, study results indicate that there is a need for culturally appropriate nutrition education and physical activity promotion specifically designed to meet the needs of Asian refugee middle school students and their parents so they can make informed decisions when adopting new lifestyles, particularly regarding food choices and physical activity.

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