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original article

Changes in health-related behaviors and their effect on dissatisfaction with body weight in youths

Mudanças nas condutas de saúde e o seu efeito na insatisfação com peso corporal em adolescentes

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Abstract – The aim of the present study was to establish whether changes in health-related behaviors are associated with changes in the satisfaction/dissatisfaction with body weight in youths. It was a prospective study that performed a secondary analysis of data from Project "Saúde na Boa", which included youths attending night classes in secondary public schools in Recife in the state of Pernambuco and Florianópolis in the state of Santa Catarina. Data on the youths' body type (thinness or excess weight) and degree of satisfaction/dissatisfaction with body weight and lifestyle (level of physical activity, participation in physical education classes, sedentary behavior and snacks, soda and alcohol intake) were collected at 10 schools from each town (five in the intervention group and five in the control group). The percentages of youths dissatisfied with their body weight were 50.5% and 48.6% at baseline and after intervention, respectively. The percentage of youths with body dissatisfaction due to thinness decreased (21.4% vs. 16.5%), while the percentage of youths with body dissatisfaction due to excess weight increased (29.1% vs. 32.1%). Approximately 41.2% of the youths with body dissatisfaction due to thinness and 18.3% of those dissatisfied due to excess weight became satisfied with their body weight after intervention. The intervention targeting health-related behaviors induced changes in the youths' degree of satisfaction with their body weight.

Key words: Body image; Interventional studies ; Healthy behaviors; Youths.

Resumo – *O objetivo do estudo foi identificar se as modificações nas condutas de saúde estão associadas às modificações na satisfação/insatisfação com a massa corporal em adolescentes. Estudo prospectivo, com análise secundária de dados do Projeto "Saúde na Boa", conduzido com estudantes do ensino médio matriculados em escolas públicas no período noturno de Recife/PE e Florianópolis/SC. Nas dez escolas (cinco controles e cinco intervenção) de cada cidade foram coletados dados sobre satisfação com a massa corporal e o tipo de satisfação (magreza ou excesso de peso), e informações referentes ao estilo de vida dos estudantes (atividade física, aulas de Educação Física, comportamento sedentário, consumo de salgados, refrigerantes e álcool). A prevalência de adolescentes insatisfeitos com a massa corporal na linha de base e após a intervenção foi de 50,5% e 48,6%. Verificou-se diminuição da insatisfação pela magreza (21,4% vs 16,5%) e aumento da insatisfação pelo excesso de peso (29,1% vs 32,1%). Parcela de adolescentes insatisfeitos por magreza (41,2%) e por excesso de peso (18,3%) passaram a ser satisfeitos com a massa corporal ao final da intervenção. A intervenção sobre as condutas de saúde provocou modificação na percepção de insatisfação com a massa corporal entre os adolescentes.*

Palavras-chave: *Adolescentes; Comportamentos saudáveis; Estudos de intervenção; Imagem corporal.*

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INTRODUCTION

Self-perception of body weight is an important component of body image, as it is related to a person's feelings and behavior towards his or her body[1]. As a function of prevailing sociocultural influences, beauty is associated by females with a thin body, while males associate it with a large and muscular body[2].

Excessive concern with body weight might alter the everyday behavior of adolescents, resulting in use of laxatives and other drugs without a medical prescription, excessive exercise and inappropriate diets, eventually giving rise to suicidal thoughts[3-6]. An inability to meet the culturally ideal esthetic standards might result in distortions of body image, which in turn might lead to eating disorders, failed attempts at controlling body weight and the use of anabolic steroids[5].

According to some studies, adolescents' satisfaction with their body weight varies among different cultural settings, as also do the factors associated with it[1,3,6]. In China[5], for instance, a study found that more than 25% of the investigated adolescents described themselves as thin, and more than 30% described themselves as overweight. That study further found that factors such as the degree of exposure to mass media, attitudes towards physical appearance and the adoption of health-risk behaviors were associated with body dissatisfaction[5]. One study conducted on adolescents in Romania[6] found that 22.6% of the participants with normal weight perceived themselves as overweight. In addition, the students from both genders who perceived themselves as overweight were more likely to exercise, exhibit inadequate dietary habits, take diet pills, vomit or take laxatives compared to the ones who did not perceive themselves as overweight[6].

In addition to family, schools are also considered responsible for youth education. Particular efforts are constantly undertaken by schools to motivate youths to develop healthy habits, as these habits are likely to persist into adulthood[7]. However, similarly, risk behaviors acquired by this time are also likely to persist in the future. For these reasons, schools are one of the main agencies involved in the formation of life habits and behaviors in adolescents[7].

Several interventions aimed at reducing unhealthy behaviors among adolescents have been developed worldwide[7-10], some of which exhibited satisfactory results, such as an increase in physical activity level, the development of appropriate dietary habits, smoking cessation and a reduction in stress. However, the impact of such interventions on adolescents' satisfaction/dissatisfaction with their body weight is still unknown, although this indirect effect is likely, as changes in health-related behaviors are associated with the satisfaction with body weight among adolescents. The data available in Brazil derive from cross-sectional studies that investigated the distribution of adolescents' dissatisfaction with their self-image, as well as its association with several factors[11-13].

The verification of a relationship between changes in health-related behaviors and changes in the satisfaction/dissatisfaction with body weight might result in guidelines for the incorporation of appropriate strategies

to modulate those behaviors among youths into educational and health policies. If evidence shows that positive changes in health-related behaviors induce positive changes in body weight perception, then interventions targeting the youths' life habits might simultaneously stimulate the development of healthy behaviors and reflect a greater awareness of body weight perception. In addition, the existence of that relationship would allow the filling of current gaps in the understanding of the causal network that links some health-related behaviors with body weight satisfaction/dissatisfaction among youths. For those reasons, the aim of the present study was to investigate whether changes in health-related behaviors are associated with changes in the satisfaction/dissatisfaction with body weight among youths.

METHODOLOGICAL PROCEDURES

Population and sample

The present study consisted of a secondary analysis of the data collected in the randomized-controlled study "Saúde na Boa"[14-16]. In that study, the aim of the intervention was to promote the development of healthy behaviors among youths attending night classes in public secondary schools at two Brazilian state capitals, Florianópolis (state of Santa Catarina - SC) and Recife (state of Pernambuco - PE) in the Southern and Northeastern regions of Brazil, respectively.

Approximately 2,000 youths aged 14 to 24 years old attending 20 randomly selected schools were assessed in March 2006 (baseline). Ten schools from each town were selected, five corresponding to the experimental group and five to the control group. The schools were matched in geographical location and size (small: up to 200 students; medium: 200 to 499 students; large: 500 or more students). A second assessment was performed nine months later (December 2006), and the response rate at follow up was 45.9% (989 participants were assessed). Detailed data related to the selected towns, target population and procedures for sample selection were described in a previous article[14]. The analysis of the participants lost to follow-up according to demographic, socioeconomic and behavioral features is provided by another article in the present supplement[15]. The present study included only the youths for whom valid data on body weight perception were available. Therefore, the sample of the present study comprised 771 high school students. Further detail on the sampling and study procedures are available in other published articles[14-16].

Dependent variable

The dependent variable was dissatisfaction with body weight, which was created from other two variables included the data collection as follows. The participants were first asked the question "*Are you satisfied with your body weight*?", to which the answer options were "*Yes*", "*No*" and "*I don't know*". The participants who answered "*Yes*" were classified as satisfied with their body weight, the ones who answered "*No*" as dissatisfied, and

the ones who answered "*I don't know*" were excluded from the analysis (5.5% and 3.1% of the participants at *baseline* and *after intervention*, respectively). In addition, as the literature recommends investigating whether dissatisfaction with the body weight is due to thinness or excess weight[17], the participants were then asked the question "*How do you rate your body weight*?", the answer options being: "*I'm too thin*", "*I'm somewhat thin*", "*My body weight is adequate (normal)*", "*I'm somewhat fat*", and "*I'm very fat*". The participants who reported dissatisfaction in question 1 and rated themselves somewhat or very thin in question 2 were classified as "*dissatisfied due to perceived thinness*"; the ones who reported dissatisfaction in question 1 and rated themselves as somewhat or very fat in question 2 were classified as "*dissatisfied due to perceived excess weight*"; the ones who reported dissatisfaction in question 1 and rated themselves as having adequate weight (4.0%) in question 2 were excluded from analysis, as the answers were considered to be inconsistent.

Independent variables

The independent variables were changes in health-related behaviors. The physical activity section assessed the number of days in a typical week the participants performed physical activity for at least 60 minutes. Additionally, the performance of localized muscular strength/resistance exercises – LMR - (number of days/week) and the participation of the volunteers in physical education classes (number of days/week) were assessed. Sedentary behavior was estimated based on the time spent every day watching TV (hours/day) and at the computer or playing video games (hours/day). The dietary habits section included the frequency of snacks and soda intake (number of days/week) and the monthly alcohol consumption (number of days/month). The difference between the values at *baseline* and *after intervention* was calculated for each health-related behavior, and the results were classified as reduced, unchanged or increased. In the description of the results, the categories were ordered from the best to the worst possible scenario.

Control variables

The following demographic and socioeconomic variables were included in analysis as potential confounding factors: gender (male or female), age, skin color (black, white, brown or other), town (Florianópolis or Recife), marital status (single or other), occupation (employed, intern or not working), lives with the family (yes or no) and housing type (house, apartment or other).

Statistical analysis

Absolute and relative frequencies were used to characterize the sample at the beginning and at the end of the study. Additionally, the variation in the health-related behaviors and the degree of satisfaction/dissatisfaction with body weight were described. The chi-square test was used to investigate whether there were significant differences in the dependent and independent variables between the assessments performed at the beginning and at

the end of the study. Adjusted multinomial logistic regression was used to calculate the odds ratio and 95% confidence interval corresponding to the relationship between the changes introduced in the health-related behaviors and the changes in the degree of satisfaction/dissatisfaction with body weight (the category "improved", which comprised the participants who reported dissatisfaction at baseline and satisfaction after intervention, was used as a reference). As the variable gender did not exhibit an association with the changes in the dissatisfaction with body weight and did not affect the results, the analysis was performed relative to the total sample. All the analyses were adjusted for potential confounding factors (gender, age, skin color, town, marital status, occupation, lives with the family, household type and behavior at baseline). The analysis was performed using the Stata software, v. 11 (Stata Corp., College Station, TX, USA), and the significance level was established as 5%.

Ethical issues

All the procedures performed in the present study were approved by the ethics committees of the Federal University of Santa Catarina (Universidade Federal de Santa Catarina – UFSC; 031/2005) and the Mother-Child Institute (Instituto Materno Infantil) of Pernambuco (587/2005). Passive consent forms were signed by the parents or guardians of the volunteers younger than 18 years old, as well as by students aged 18 years or older.

RESULTS

The sample comprised participants from Florianópolis, SC (52.3%) and Recife, PE (47.7%). Most of the participants were female, aged 14 to 18 years old, self-reported to be white, single, lived with their families, did not work and lived in houses (Table 1).

The prevalence of participants dissatisfied with their body weight at baseline was 50.5%, and it exhibited little variation after nine months of intervention (48.6%). Approximately 29.1% of the participants reported dissatisfaction due to excess weight at baseline, and 81.3% of them remained dissatisfied after intervention, whereas 18.3% became satisfied with their body weight ($p < 0.01$). Approximately 21.4% of the participants reported dissatisfaction due to thinness at baseline, and a little more than half of them remained dissatisfied after intervention, while 41.2% became satisfied with their body weight ($p < 0.01$). Approximately 10.2% of the participants who reported to be satisfied with their body weight at baseline (49.5%) were dissatisfied due to excess weight at the end of the study, while 14.7% reported to be dissatisfied due to thinness (Figure 1).

The results on the prevalence of the health-related behaviors at baseline and after nine months of intervention show reductions in the weekly frequency of physical activity, snacks and soda intake and monthly use of alcohol, as well as increases in the weekly frequency of LMR exercises and the time spent every day at the computer or playing video games (Table 2).

Table 1. Characterization of the participants at baseline with valid data for the present study (n = 771)

Variable	Baseline
	n (%)
City (n = 771)	
Florianópolis, SC	403 (52.3)
Recife, PE	368 (47.7)
Gender (n =770)	
Female	460 (59.7)
Male	310 (40.3)
Age range (years) (n =771)	
14–18	461 (59.8)
19–24	310 (40.2)
Skin color (n = 768)	
White	336 (43.8)
Brown	290 (13.6)
Black	105 (37.8)
Other	37 (4.8)
Marital status (n = 770)	
Single	667 (86.6)
Married/with partner	103 (13.4)
Lives with the family (n = 771)	
Yes	690 (89.5)
No	81 (10.5)
Housing type (n =769)	
House	695 (90.4)
Apartment/other	74 (9.6)
Occupation (n =771)	
Not working	426 (55.3)
Intern/volunteer	117 (15.6)
Paid job	224 (29.1)

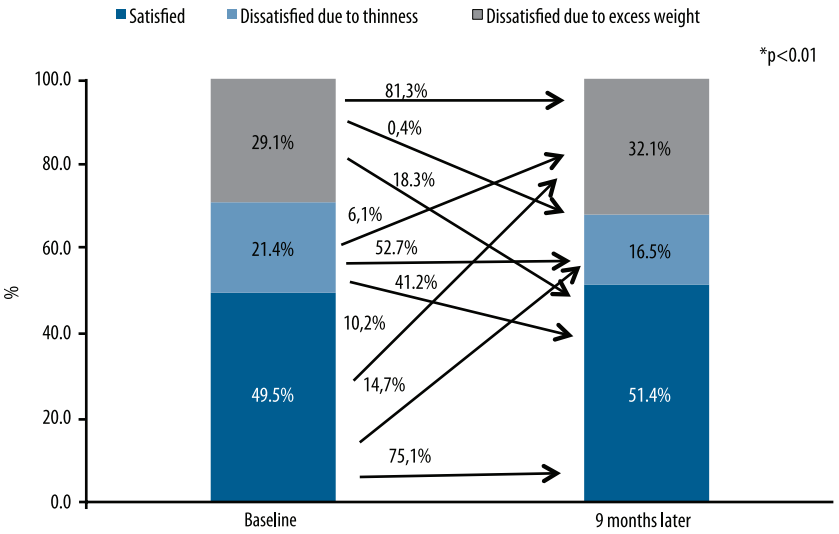

Figure 1. Prevalence of and changes in body weight perception at baseline and at nine-month follow up as assessed in youths attending secondary school (n = 771); * chi-square test

The analysis of the association between the changes in body weight perception and changes in health-related behaviors adjusted for potentially confounding factors (Table 3) showed that the odds ratio for maintenance of the body weight perception was higher among the participants with no changes in the weekly soda intake compared to those who reduced it. Among the participants who became dissatisfied with their body weight, maintenance of the weekly frequency

of LMR exercises and of soda intake exhibited a significant association with negative changes in body weight perception. An increase in the number of hours spent each day at the computer or playing video games exhibited a significant association with a higher odds ratio for becoming dissatisfied with body weight.

Table 2. Frequencies of health-related behaviors at baseline and after nine months of intervention (n = 771)

Variable	Baseline	After 9 months	p*
	n (%)	n (%)	
Physical activity (days/week) (n = 765)			
≥ 5	347 (45.4)	250 (32.7)	< 0.01
< 5	418 (54.6)	515 (67.3)	
LMR exercises (days/week) (n = 756)			
≥ 1	266 (35.2)	326 (43.1)	< 0.01
None	490 (64.8)	430 (56.9)	
PE classes (days/week) (n = 737)			
≥ 1	398 (54.0)	397 (53.9)	1.00
None	339 (46.0)	340 (46.1)	
Snacks (days/week) (n = 761)			
< 5	542 (71.2)	598 (78.6)	< 0.01
≥ 5	219 (28.8)	163 (21.4)	
Sodas (days/week) (n = 762)			
< 5	485 (63.6)	524 (68.8)	0.04
≥ 5	277 (36.4)	238 (31.2)	
Alcohol (days/months) (n = 756)			
None	390 (51.6)	405 (53.6)	0.02
≥ 1	366 (48.4)	351 (46.4)	
TV (hours/day) (n = 769)			
< 2	289 (37.6)	320 (41.6)	0.12
≥ 2	480 (62.4)	449 (58.4)	
Computer/Video games (hours/day)			
< 2	577 (75.7)	535 (70.2)	0.02
≥ 2	185 (24.3)	227 (29.8)	

LMR: localized muscular resistance; *chi-square test

DISCUSSION

The aim of the present study was to investigate whether changes in health-related behaviors are associated with changes in the satisfaction/dissatisfaction of youths with their body weight. The main finding of the present study is that changes in some health-related behaviors (not increasing the weekly frequency of LMR exercises, not reducing the weekly frequency of soda intake and increasing the amount of time spent each day at the computer or playing video games) exhibited significant associations with negative changes in the satisfaction with body weight. These results emphasize the relevance of the promotion of healthy lifestyles and show that changes in the latter might improve the satisfaction of youths with their body image.

However, the results of the present study should be interpreted cautiously as they might be distorted by possible bias because the present study consisted of a secondary analysis of data, and thus the measures of effect and associations found might result from spurious associations (black-box effect). Those limitations notwithstanding, the evidence points to a robust

Table 3. Association between body weight perception (reference category: improved perception) and health-related behaviors in youths.

			Body mass perception (reference category = improved perception*)		
			Unchanged	Worse†	
	n	%	OR‡ (95% CI)	%	OR‡ (95% CI)
Physical activity (days/week)					
Increased	247	75.7	1.00	8.9	1.00
Unchanged	164	79.9	1.78 (0.87; 3.61)	7.9	1.17 (0.41; 3.35)
Decreased	330	80.3	0.96 (0.56; 1.63)	5.5	0.54 (0.23; 1.28)
LMR exercises (days/week)					
Increased	201	75.6	1.00	6.5	1.00
Unchanged	401	79.3	1.12 (0.64; 1.96)	9.0	2.51 (1.02; 6.45)
Decreased	154	79.9	1.46 (0.72; 2.96)	4.5	1.92 (0.55; 6.62)
PE classes (days/week)					
Increased	120	80.0	1.00	7.5	1.00
Unchanged	515	78.6	0.88 (0.44; 1.73)	7.0	0.65 (0.22; 1.86)
Decreased	102	76.5	0.77 (0.32; 1.82)	8.8	0.72 (0.18; 2.78)
Snacks (days/week)					
Increased	337	72.4	1.00	8.9	1.00
Unchanged	180	86.1	1.78 (0.93; 3.39)	5.0	0.44 (0.13; 1.47)
Decreased	244	81.6	1.24 (0.71; 2.17)	6.6	0.82 (0.34; 1.93)
Sodas (days/week)					
Increased	301	75.4	1.00	5.6	1.00
Unchanged	218	82.1	1.87 (1.01; 3.50)	8.7	3.78 (1.42; 10.04)
Decreased	243	79.4	1.44 (0.83; 2.47)	7.8	1.93 (0.78; 4.79)
Alcohol (days/month)					
Increased	189	75.1	1.00	5.3	1.00
Unchanged	393	80.2	1.66 (0.96; 2.86)	7.9	2.30 (0.90; 5.83)
Decreased	174	79.9	1.29 (0.69; 2.42)	7.5	1.81 (0.61; 5.30)
TV (hours/day)					
Increased	325	77.5	1.00	6.5	1.00
Unchanged	227	81.5	1.07 (0.60; 1.90)	5.7	0.71 (2.68; 1.88)
Decreased	217	77.4	1.00 (0.56; 1.78)	10.1	1.40 (0.57; 3.40)
Computer/video game (hours/day)					
Increased	162	77.2	1.00	5.6	1.00
Unchanged	354	78.8	0.91 (0.49; 1.68)	7.1	1.25 (0.43; 3.66)
Decreased	246	79.3	1.19 (0.62; 2.27)	8.9	2.79 (1.01; 8.37)

LMR: localized muscular resistance; *improved perception: participants dissatisfied at baseline who became satisfied; †worse: participants satisfied at baseline who became dissatisfied; ‡Analysis adjusted for: gender, age, skin color, town, marital status, occupation, lives with family and housing type; OR: *odds ratio*; CI: confidence interval. Values in bold correspond to $p \leq 0.05$.

association between the youths' satisfaction/dissatisfaction with their body weight and their dietary habits and performance of physical activity (the main components of the intervention program)[18,19].

The subjectivity characterizing the measures used to assess the health-related behaviors might account for the lack of an association between those variables and the participants' satisfaction/dissatisfaction with their body weight found at some moments, and consequently, this subjectivity is a limitation of the present study. One additional limitation derives from the duration of the follow-up period, nine months, which might have been too short to allow the detection of significant associations with some of the assessed variables. Finally, the loss of more than 50% of the sample is another limitation.

The prevalence rates of youths dissatisfied with their body weight were 50.5% and 48.6% at baseline and after intervention, respectively. Approxi-

mately 29.1% of the sample reported dissatisfaction due to excess weight at baseline, and almost one fifth of the participants became satisfied with their body weight after intervention. Approximately 21.4% of the sample reported dissatisfaction due to thinness, and 41.2% of these participants became satisfied with their body weight after intervention. These findings show that the investigated intervention changed the perception and satisfaction/dissatisfaction of the youths with their body weight, and thus, they disagree with the results of studies that did not find positive changes in the degree of satisfaction of youths with their body weight[20]. One longitudinal study that followed youths from Minnesota, USA over 10 years found that the female and male participants' body dissatisfaction increased between middle and high school, that the body dissatisfaction increased further during the transition to young adulthood and that this increase was associated with an increase in the body mass index (BMI) over time[21]. One study that investigated the relationships between longitudinal weight status, body dissatisfaction and the attitude toward weight loss among South Korean children from the ages of 7–8 to 13–14 years old found that the girls favored thinner shapes than the boys did, regardless of weight status or changes in BMI. In contrast, in the boys, the desire to lose weight was related only to weight loss attempts and was independent of the weight status, BMI changes and level of body dissatisfaction[22].

The studies conducted in Brazil with a cross-sectional design show that youths exhibit high levels of body dissatisfaction[11,12]. Those findings are a source of concern, as dissatisfaction with body image is associated with eating disorders[13].

In the present study, the participants who did not change their frequency of soda intake exhibited a higher likelihood of maintaining a negative perception of their body weight compared to those who reduced it. These findings agree with the results of a study conducted on Spanish teenagers (12 to 17 years old), which found greater soda intake among overweight participants dissatisfied with their body image compared to the overweight participants satisfied with their body image[19]. In the present study, unchanged frequencies of LMR exercises and soda intake exhibited a significant association with negative changes in body weight perception. One study conducted on college students found that body image was a significant factor in determining the amount of exercise for a majority of the participants (58.3%)[23]. According to the literature, adolescents who perceive themselves as overweight are more likely to exercise to lose weight compared to those who do not perceive themselves as overweight[24]. Dissatisfaction with body image might both motivate the participants to exercise[24] and facilitate exercise[25].

Increases in the time spent at the computer or playing video games exhibited a significant association with individuals becoming dissatisfied with their body weight. According to the literature, in addition to the BMI, the social pressure to be thin and the internalization of the ideal body image prescribed by the mass media and society at large are strong

predictors of body dissatisfaction[20]. Adolescents are vulnerable to the messages and images conveyed by the mass media, and some of them are unable to discriminate these images from reality; they are often unaware of the manipulation of images by digital technologies that often results in unrealistic body ideals, which are impossible to attain[18].

The following strong points of the present study stand out. First, its prospective design allowed the analysis of changes in the participants' health-related behaviors and their association with changes in the satisfaction/dissatisfaction with body weight. Second, the inclusion of various types of health-related behaviors allowed for the analysis of several factors potentially associated with body dissatisfaction, thus denoting that the scope of this subject should be more comprehensive when it relates to youths. Finally, the sample comprised participants from two towns located in Brazilian areas exhibiting different sociocultural profiles, which allows for a broader extrapolation of the results.

CONCLUSIONS

The intervention investigated in the present study changed the degree of dissatisfaction of the assessed youths with their body weight. A fraction of the participants who reported dissatisfaction due to thinness (41.2%) or excess weight (18.3%) became satisfied with their body weight after intervention. The factors that exhibited significant associations with the shift from initial satisfaction to dissatisfaction with body weight at the end of the study were a lack of an increase in the frequency of LMR exercises, a lack of a reduction in the frequency of soda intake and an increase in the time spent every day at the computer or playing video games. Future interventional studies, including those on strategies designed to induce changes in body weight perception, might improve the degree of satisfaction of youths with their body image and consequently promote changes in a series of health-related behaviors.

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