Association between eating behaviors and positive self-perception of health in Brazilian Adults

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Abstract: Association between eating behaviors and positive self-perception of health in Brazilian Adults. Introduction. Healthy eating habits are related to a lower prevalence of chronic diseases. **Objective:** Verify the relationship between eating behaviors and self-perceived health (SPH) in young, middle-aged, and older adults. **Materials and methods:** This is a cross-sectional study with 52166 Brazilian adults aged 18 years and over. The dependent variable was positive SPH, whereas the independent variable was the eating behavior (exchanging lunch for snacks; exchanging dinner for snacks; intake of beans, ultra-processed food the previous day, fruits, vegetables, and processed juices/soft drinks). Poisson regression with robust adjustment for variance was used in the data analysis. **Results:** The relationship between eating behaviors and SPH was similar between genders. However, a more evident relationship was observed among young adults, regarding the age group. The consumption of fruits and vegetables was most clearly associated with SPH among the investigated behaviors. Furthermore, the higher the number of positive eating behaviors, the higher the prevalence of positive SPH in both genders and all age groups. **Conclusion:** The findings of this study reinforce the importance of healthy eating behaviors for health and indicate a more direct relationship between these and positive SPH in young adults and as a habit of regularly consuming fruits and vegetables. **Arch Latinoam Nutr 2022; 72(2): 84-92.**

Keywords: perception, health, feeding behavior, cross-sectional studies, epidemiological surveys.

Resumen: Asociación entre el comportamiento alimentario y la salud auto percibida en adultos brasileños. Introducción: Los hábitos alimentarios positivos se relacionan con una menor prevalencia de enfermedades crónicas. **Objetivo:** Verificar la relación entre las conductas alimentarias y la salud auto percibida (SA) en adultos jóvenes, de mediana edad y ancianos. **Materiales y métodos:** Se trata de un estudio transversal con 52166 adultos de 18 años o más en Brasil. La variable dependiente fue la SA positiva, mientras que la variable independiente fue la conducta alimentaria (cambio de almuerzo por refrigerio; cambio de cena por un refrigerio, consumo de frijoles, comida ultra procesada, fruta, verdura y zumos/refrescos artificiales el día anterior a la entrevista). En el análisis de datos, se utilizó la regresión de Poisson con ajuste robusto para la varianza. **Resultados:** La relación entre las conductas alimentarias y la SA fue similar entre los géneros, pero en relación al grupo de edad, se observó una relación más evidente en adultos jóvenes. De los comportamientos investigados, el consumo de frutas y verduras fueron los que se asociaron más claramente con la SA. Cuanto mayor es el número de conductas alimentarias positivas, mayor es la prevalencia de SA positiva, en ambos sexos y en todos los grupos de edad. **Conclusión:** Los hallazgos de este estudio refuerzan la importancia de un comportamiento alimentario saludable para la mejorar y mantener la salud e indican que, aparentemente, existe una relación más explícita entre éste y la SA positiva en adultos jóvenes, al igual que con el hábito de consumir frutas y verduras con frecuencia. **Arch Latinoam Nutr 2022; 72(2): 84-92.**

Palabras clave: percepción, salud, conducta alimentaria, estudios transversales, encuestas epidemiológicas.

Introduction

While assessment of an individual's health status is challenging, self-perceived health (SPH) is associated with objective health measures, such as laboratory, physical, and cognitive tests (1). Ailing SPH is associated with increased mortality

(2-4) and increased prevalence of one or more morbidities, such as diabetes (5,6), cardiovascular diseases (7,8), obesity (9), and other non-communicable health problems (6,10,11). SPH has been considered a good predictor of the general health condition of individuals (1) and is an epidemiological measure that has shown good reproducibility when applied to different populations (12, 13).

Current research on SPH has aimed to relate SPH with lifestyle variables (14-19) and has tested the association with behavioral variables, such

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as physical inactivity (11,14), alcohol abuse (14,20), eating behaviors (14-19), and tobacco use (14,21).

Regarding studies on eating behaviors, most of them use one or a few food indicators. The most common behavior evaluated is the consumption of fruits and vegetables (14,20-24). Among the eating behaviors considered are the consumption of dietary fats (22,25,26), consumption of eggs and legumes (15,20), and breakfast (18,27). Studies on the relationship between eating behaviors and SPH in adolescents (18,19,27), university students (17), and older adults (15,20,28) are frequent while scarce in young and middle-aged adults (22,26). Few studies cover different age groups (11,23) and very rarely analyze the relationship between SPH and eating behaviors (23). Studies that performed some stratification by age found significant variations between associations (11, 23).

A higher number of associations was found in adults (20-64 years) (11) in a study carried out with Brazilians relating SPH to health behaviors and morbidities. Another study carried out in Greece observed a more significant number of associations between the studied eating behaviors and SPH in younger individuals (15-29 years) than the other age groups (30 to 49 years and over 50 years of age) (23).

Given this context, this study aimed to analyze the association between seven eating behaviors and SPH in young, middle-aged, and older Brazilian adults.

Materials and methods

It is a cross-sectional study from the database of the 2017 Surveillance System for Risk and Protection Factors for Chronic Diseases (VIGITEL). VIGITEL has been conducted annually since 2006 and is a telephone survey in the 26 capitals of the Brazilian states and the Federal District. The sample is probabilistic. The sample is probabilistic. Residents aged 18 years or more, selected from the local telephone listings, were interviewed. For each capital, samples generally consisted of about 2000 individuals. The 2017 survey interviewed 52631 individuals (29).

The dependent variable of this study was positive SPH, obtained through the question "Would you rate your health status as?" with the following response options: Excellent; Good; Fair; Poor; Very Poor. The responses were dichotomized into positive and negative SPH. Those who answered "excellent" and "good" were considered with positive SPH and those who answered "fair", "poor", and "very poor" with negative SPH.

The independent variables were seven eating behaviors: exchanging lunch for snacks (never/rarely; 1-7 days a week); exchanging dinner for snacks (never/rarely; 1-7 days a week); bean consumption (≥5 days a week; <5 days a week); consumption of ultra-processed food in the previous day (yes; no); fruit consumption (≥5 days a week; <5 days a week); vegetable consumption (≥5 days a week; <5 days a week); consumption of processed juices and soft drinks (never/rarely; 1-7 days a week). These same eating patterns were considered in the construction of a score, where the number of healthy behaviors for each subject was evaluated so that this score can vary between 0 and 7, this score has not been previously validated by another study. These eating behaviors were available for analysis in the VIGITEL database initially with the categories 1 to 2 days a week; 3 to 4 days a week; 5 to 6 days a week; every day; almost never; never. The categorization of the variables was arbitrary, except for the consumption of fruits and vegetables, which is more commonly observed in the literature with the dichotomization used (14, 29).

In the question regarding the consumption of ultra-processed food the previous day, intake of stuffed biscuits, snacks, sausages, and instant noodles was considered as consumption of ultra-processed food. Other foods fall into this classification, but only the consumption of these four foods was considered due to limitations of the studied database.

Other variables were analyzed to describe the sample and perform the control for possible confounding factors: gender (female/male), age (in years), skin color (white/black/brown/yellow/indigenous), marital status (single/married or common-law marriage/widowed/separated), schooling (in full years), reported morbidity (diabetes, hypertension, obesity), and health behaviors (leisure physical activity, alcohol abuse, and tobacco use).

All tested associations were stratified by gender and three different age groups: young, middle-aged, and older adults, where young adults range from 18 to 39 years, middle-aged adults from 40 to 59 years, and older adults 60 years and over. The choice of age groups was arbitrary, as the definition of middle age is still scarce, while the senile phase is usually adopted after 60 years old (30).

The Wald method calculated the prevalence ratio (PR), considering the 95% confidence interval (95% CI). The adjusted prevalence ratio (PRadj) was calculated using the Poisson regression with robust adjustment for variance. To this end, a regression model was built and included the sociodemographic, referred morbidity, and behavioral variables. All analyses were performed using the SPSS vs. 19.0. The procedures related to VIGITEL were approved by the National Human Research Ethics Committee of the Brazilian Ministry of Health (29).

Results

In 2017, 465 of 52166 VIGITEL respondents did not answer the specific question about SPH and were excluded from this study. Most of the respondents were female (63.1 %), 47.5 % were self-referred as white, 48.0 % lived with their partner, and 40.1 % were 60 years of age or older. Concerning SPH, 17.6 % referred to their health as "excellent", 48.7 % as "good", 29.4 % as "fair", 3.2 % as "poor", and 1.1 % as "very poor" (Table 1).

SPH was associated with all seven eating behaviors studied in young adult women. In middle-aged women, only the variables related to the consumption of fruits and vegetables were associated with SPH. For older adults were equally concerning these same variables (fruits and vegetables) along with exchanging lunch and dinner for snacks. Of these associations, the prevalence of positive SPH was higher among those with healthy eating behaviors, except for exchanging dinner for snacks in older adults, where older women who reported never or rarely exchanging dinner for snacks had a lower prevalence of positive SPH than those who referred to carrying out this exchange 1-7 days a week (Table 2).

Concerning men, the results were similar to those observed in women. All eating behaviors were associated with SPH in young adults, while middle-aged men showed an association with the

Table 1: Distribution of the sample, according to social and demographic variables. VIGITEL, Brazil, 2017. (n = 52631).

Variables	n	%
Gender		
Female	33219	63.1
Male	19412	36.9
Age group		
Young adults (18-39 years)	13935	26.5
Middle-aged (40-59 years)	17615	33.5
Older adults (60 years and over)	21081	40.1
Skin color		
White	22686	43.6
Black	4303	8.3
Yellow	591	1.1
Brown	19524	37.5
Indigenous	651	1.3
Schooling		
0-8 years of study	14411	26.5
9-11 years of study	18144	33.5
12 years of study and over	20076	40.1
Marital status		
Single	15628	30.2
Married or common-law marriage	25300	48.9
Widower	6221	12
Separated or divorced	4624	8.9
Self-perceived health		
Excellent	9202	17.5
Good	25383	48.2
Fair	15313	29.1
Poor	1693	3.2
Very poor	575	1.1
Eating behaviors		
Exchanges Lunch for Snacks (Never or rarely)	45077	85.6
Exchanges Dinner for Snacks (Never or rarely)	23660	45
Consumption of beans (≥ 5 days a week)	27619	52.5
Consumption of ultra-processed food the day before (No)	38100	72.6
Consumption of fruits (≥ 5 days a week)	36120	68.6
Consumption of vegetables (≥ 5 days a week)	27945	53.1
Consumption of processed juices or soft drinks (Never or rarely)	27279	51.8

Table 2: Association between food consumption and positive self-perceived health in women living in Brazilian capitals. VIGITEL, Brazil, 2017. (n = 33219).

Variables		Young female adults PRadj (95% CI) *	Middle-aged female adults PRadj (95% CI) *	Elderly females PRadj (95% CI) *
Exchanges Lunch for Snacks	1 to 7 days a week	1	1	1
	Never or rarely	1,18(1,09;1,29)	1,04(0,96;1,13)	1,14(1,06;1,22)
Exchanges Dinner for Snacks	1 to 7 days a week	1	1	1
	Never or almost never	1,07(1,01;1,16)	0,95(0,90;1,01)	0,94(0,90;0,98)
Consumption of Beans	<5 days a week	1	1	1
	≥ 5 days a week	1,12(1,04;1,20)	1,06(1,00;1,12)	1,05(1,00;1,09)
Consumption of Ultra-processed Food the day before	Yes	1	1	1
	No	1,13(1,05;1,22)	1,04(0,98;1,11)	1,00(0,93;1,06)
Consumption of Fruits	<5 days a week	1	1	1
	≥ 5 days a week	1,28(1,18;1,38)	1,19(1,12;1,26)	1,14(1,09;1,19)
Consumption of Vegetables	<5 days a week	1	1	1
	≥ 5 days a week	1,33(1,23;1,44)	1,30(1,23;1,38)	1,32(1,26;1,38)
Consumption of Processed Juices or Soft Drinks	1 to 7 days a week	1	1	1
	Never or rarely	1,17(1,08;1,26)	1,02(0,96;1,08)	0,99(0,94;1,03)

95% CI: 95% Confidence Interval.
* Adjustment of variables for gender, age, skin color, marital status, schooling, diabetes, hypertension, obesity, leisure-time physical activity, alcohol abuse, and tobacco use.

consumption of fruits, vegetables, and beans, and older adults, only with fruits and vegetables. In all of these associations, the prevalence of positive SPH was higher among those with healthy eating behaviors (Table 3).

Regarding the prevalence of SPH with the number of healthy eating behaviors, a similar trend was observed in both genders, and the higher the number of healthy eating behaviors considered, in general, the higher the prevalence of positive SPH in all age groups (Figures 1 and 2).

Table 3: Association between food consumption and positive self-perceived health in men living in Brazilian capitals. VIGITEL, Brazil, 2017. (n = 19412).

Variables		Young male adults PRadj (95% CI) *	Middle-aged male adults PRadj (95% CI) *	Elderly males PRadj (95% CI) *
Exchanges Lunch for Snacks	1 to 7 days a week	1	1	1
	Never or rarely	1,17(1,07;1,30)	1,10(0,98;1,24)	1,11(1,00;1,23)
Exchanges Dinner for Snacks	1 to 7 days a week	1	1	1
	Never or almost never	1,18(1,07;1,31)	0,97(0,89;1,06)	0,97(0,91;1,04)
Consumption of Beans	<5 days a week	1	1	1
	≥ 5 days a week	1,20(1,10;1,32)	1,10(1,02;1,20)	1,07(1,00;1,15)
Consumption of Ultra-processed Food the day before	Yes	1	1	1
	No	1,24(1,13;1,36)	1,00(0,90;1,09)	1,04(0,97;1,13)
Consumption of Fruits	<5 days a week	1	1	1
	≥ 5 days a week	1,31(1,18;1,46)	1,23(1,13;1,35)	1,21(1,13;1,29)
Consumption of Vegetables	<5 days a week	1	1	1
	≥ 5 days a week	1,36(1,23;1,50)	1,22(1,12;1,33)	1,21(1,13;1,30)
Consumption of Processed Juices or Soft Drinks	1 to 7 days a week	1	1	1
	Never or rarely	1,21(1,08;1,35)	0,96(0,88;1,04)	1,00(0,94;1,07)

95% CI: 95% Confidence Interval.
* Adjustment of variables for gender, age, skin color, marital status, schooling, diabetes, hypertension, obesity, leisure-time physical activity, alcohol abuse, and tobacco use.
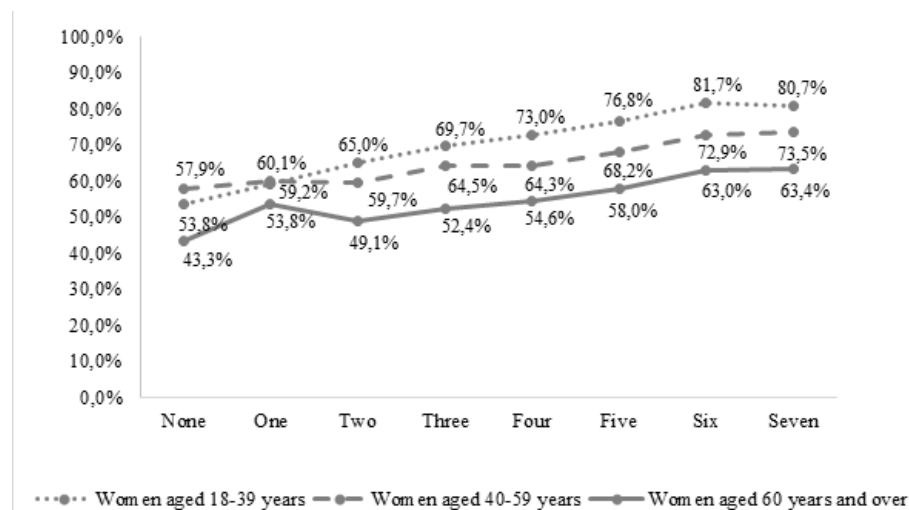

Figure 1: Prevalence of positive self-perceived health according to the score of healthy eating behaviors, in adult women aged 18 years or older living in Brazilian capitals. VIGITEL, Brazil, 2017. (n = 33219).
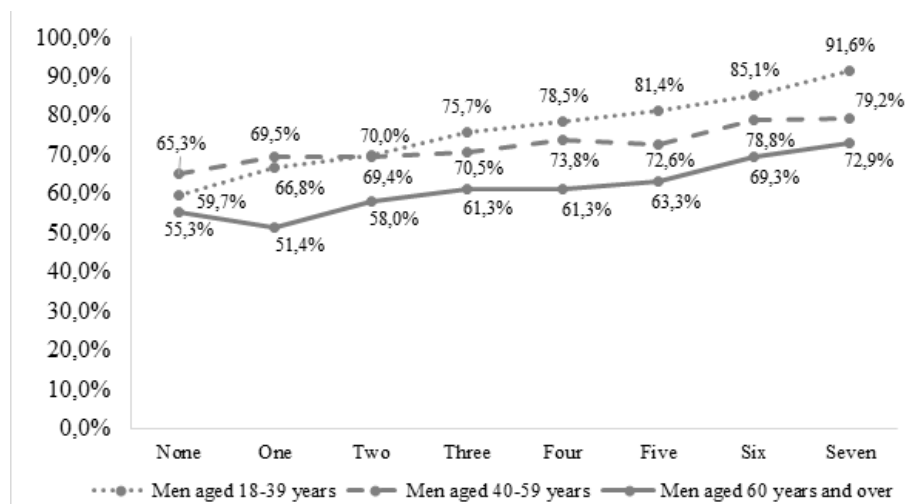
Figure 2: Prevalence of positive self-perceived health according to the score of healthy eating behaviors, in adult men aged 18 years or older living in Brazilian capitals. VIGITEL, Brazil, 2017. (n = 19412).

Discussion

Among the main findings of the study are: 1) The relationship between eating behaviors and positive SPH was more evident among young adults than between middle-aged and older adults; 2) All of the investigated eating behaviors showed at least one significant association with SPH, confirming the hypothesis of a positive relationship between healthy eating behavior and the best SPH ; 3) Of the eating patterns investigated, those related to the intake of fruits and vegetables showed a most evident relationship with positive SPH; 4) The higher the number of positive eating behaviors assumed, the higher the prevalence of positive SPH in both genders and all age groups.

This research observed a higher number of associations between the positive SPH relationship and eating behavior among the younger population, and similar results were found by Darviri *et al.* (23). These findings deserve special mention since there appears to be a higher awareness among younger people than among middle-aged and older individuals regarding health issues. Future studies could seek a more in-depth understanding of the issues related to eating habits by age group, including what each group considers healthy eating and its relationship with a better SPH. At least part

of these results is attributable to the fact that younger individuals are more concerned with body aesthetics when compared to older individuals. For example, it would be worth investigating how many variables related to body image satisfaction can mediate the relationship between food eating patterns and self-perceived health. This study does not provide information on body image.

Of the dietary behaviors studied, the consumption of fruits and vegetables is the most strongly associated with a positive SPH. A similar relationship was found among Greeks by Darviri *et al.* (23) when relating five eating behaviors with SPH (consumption of meat, vegetables, fruits, legumes, and fish). Babo *et al.* (15), considered nine eating patterns (intake of red meat, fish, fruits, vegetables, water, percentage of carbohydrates, proteins, fats, and fibers in the diet) in older Portuguese adults, and by Hong & Peltzer, (27), who evaluated eight eating behaviors in Korean adolescents (breakfast, consumption of soft drinks, juices, caffeinated drinks, fast food, fruits, vegetables, and milk).

The strong relationship between positive SPH and regular consumption of fruits and vegetables is possibly explained by the high nutritional value of these foods and their role as regulators of the human body's biological processes, given their high vitamins, minerals, and fiber content (31,32). It is worth mentioning that Brazilian health authorities encourage the intake of these foods through public policies (33,34).

Among the findings of this research, the association between "rarely exchanging lunch and dinner" with positive SPH in young adults of both genders is noteworthy. The frequent replacement of conventional meals (breakfast/lunch/dinner) for snacks and fast foods is related to poor health indicators such as high body fat, obesity, hypertension, hypercholesterolemia, and diabetes (35). In general, quick snacks tend to be low in micronutrients and have high-fat contents (35,36). A possible hypothesis that explains the association between making the eventual exchange of dinner for snacks with positive SPH in older women is that the energy needs in this group are lower when compared to the other groups studied, and possibly the foods consumed to replace dinner do not necessarily represent unhealthy foods, but only fewer calories.

This study found an association between regular consumption of beans in young adults of both genders and middle-aged adult men. It is still uncommon to associate this behavior with positive SPH. It is more common in the literature to associate health-related behaviors with the consumption of legumes and eggs (15,20). Beans are a legume of high nutritional value, rich in proteins, iron, and other micronutrients (37), and are present in the diet of many Brazilians (29). Studies have found associations between the regular intake of this food and keeping weight within the desired parameters and as well as the protection against various diseases (37,38).

An important finding in this study is the strong relationship observed between the number of healthy eating behaviors and the awareness of positive SPH. It applies for both genders and the three age groups investigated.

This study has some limitations, such as the cross-sectional design that does not allow to conclude regarding causality, and the non-presence of variables related to economic level or income (which can be minimized by having used schooling, which is a critical income/economic level proxy). In addition, the difficulty in accurately measuring food intake, given the complexity of this behavior, the lack of validity of some eating behaviors studied and its score, and the subjective nature of the SPH variable makes it problematic to accurately determine which aspects an individual considers when answering how they perceive their current health status.

The strengths of this research are the good statistical power to verify the associations and originality since few studies have invested in the association of several eating behaviors with positive SPH. The stratified analysis by age group allowed observing important specificities regarding the association of eating behaviors and SPH by age group.

Future research may include other dietary indicators and better understand what people understand as healthy and unhealthy foods. Longitudinal studies, which allow advancing concerning knowledge about the causality of the relationship between food and self-perceived health, would also be of great importance.

Conclusion

The study points out that healthy eating behaviors are associated with better SPH, and this relationship is more explicit in young adults with regular intake of fruits and vegetables. These findings rein force the importance of promoting healthy eating public policies.

Acknowledgments

Conflict of interest

The authors declare no conflict of interest.

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