

Co-occurrence of health risk behaviors and the family context among Brazilian adolescents, National Survey of School Health (2015)

Coexistência de comportamentos de risco à saúde e o contexto familiar entre adolescentes brasileiros, Pesquisa Nacional de Saúde do Escolar (2015)

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ABSTRACT: *Objective:* To evaluate the association between the co-occurrence of risk behaviors (RB) and the family context in Brazilian adolescents. *Methods:* Cross-sectional study on 101,534 students from the 9th grade of elementary school in the National Survey of School Health – PeNSE 2015. The co-occurrence of RB was estimated by the sum of the presence of sedentary behavior, low fruit consumption, regular consumption of alcohol and tobacco. Prevalence was assessed using the Venn diagram and multivariate analysis by the ordinal logistic regression model of partial proportional odds. *Results:* 8.8% of the adolescents did not have RB; 34.5% had one; 42.7% had two; and 14.1%, three or four. The most prevalent combinations were between sedentary behavior and low fruit consumption (33.8%); sedentary behavior with low fruit consumption and regular consumption of alcohol (9.5%). Those who were more likely to present co-occurrence had mothers with higher education level in all models, did not live with their fathers [0, 1 and 2 vs. 3: (OR = 1.21; 95%CI 1.07–1.37)], had parents who sometimes, never or rarely understood their problems and concerns [0, 1 and 2 vs. 3: (OR = 1.62; 95%CI 1.49–1.76)] and monitored their homework [0, 1 and 2 vs. 3: (OR = 1.77; 95%CI 1.62–1.93)]; and had meals with parents or guardians <4 days/week for the three models. *Conclusion:* Health RB tend to cluster among Brazilian adolescents and are related to characteristics of the family context. These findings point to the need for health promotion actions focusing on simultaneity and not in isolation.

Keywords: Adolescent. Health behavior. Risk factors. Adolescent health.

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RESUMO: *Objetivo:* Avaliar a associação entre a coexistência de comportamentos de risco (CR) e o contexto familiar em adolescentes brasileiros. *Métodos:* Estudo transversal com 101.534 estudantes do 9º ano do ensino fundamental na Pesquisa Nacional de Saúde do Escolar 2015. A coexistência de CR foi estimada pelo somatório da presença de comportamento sedentário, baixo consumo de frutas e consumo regular de álcool e tabaco. A prevalência foi avaliada usando o diagrama de Venn e a análise multivariada por meio da regressão logística ordinal de chances parciais. *Resultados:* 8,8% dos adolescentes não apresentaram CR; 34,5% tinham um; 42,7% tinham dois; e 14,1%, três ou quatro. As combinações mais prevalentes foram entre comportamento sedentário e baixo consumo de frutas (33,8%); e comportamento sedentário com baixo consumo de frutas e consumo regular de álcool (9,5%). Tiveram maior chance de coexistência aqueles que tinham mães com maiores escolaridades em todos os modelos, não morar com os pais [0, 1 e 2 vs. 3: (*odds ratio* — OR = 1,21; intervalo de confiança de 95% — IC95% 1,07 – 1,37)], ter pais que às vezes, nunca ou raramente entendiam seus problemas e preocupações [0, 1 e 2 vs. 3: (OR = 1,62; IC95% 1,49 – 1,76)] e acompanhavam o dever de casa [0, 1 e 2 vs. 3: (OR = 1,77; IC95% 1,62 – 1,93)]; e realizar refeições com os pais ou responsáveis < 4 dias/semana para os três modelos. *Conclusão:* Os CR relacionados à saúde tendem a se agrupar entre os adolescentes brasileiros e estão associados a características do contexto familiar. Esses achados apontam para a necessidade de ações de promoção de saúde com foco na simultaneidade, e não de forma isolada.

Palavras-chave: Adolescente. Comportamentos relacionados com a saúde. Fatores de risco. Saúde do adolescente.

INTRODUCTION

Health risk behaviors are identified as precursors of future conditions of illness and the development of several comorbidities, including noncommunicable diseases (NCDs)^{1,2}. The World Health Organization (WHO) indicates that the main risk behaviors related to NCDs are the regular consumption of tobacco and alcohol, physical inactivity, sedentary behavior, and inadequate diet².

The adoption of risk behaviors in adolescence is linked to the search for greater independence, identity, and acceptance in social groups of which adolescents are part¹. Therefore, understanding the effects of the co-occurrence of risk behaviors is important, as they affect the health-disease process throughout adolescence and adulthood^{2,3}.

Studies show that health behaviors or health risk behaviors displayed in adolescence are interrelated to multiple determinants in the biological, individual, social, and contextual spheres¹⁻³. As for the contextual sphere, family aspects are highlighted, considering that the family context plays an important role in the human development subsystem. This context is responsible for functions of individual support, protection, and affection for the adolescent, providing an environment conducive to learning, maturation, and the exercise of citizenship⁴.

The family context can affect the development of potentialities during adolescence and how adolescents relate to the social environment in which they are inserted. Thus, vulnerabilities and problems experienced in family relationships, behaviors adopted in the family nucleus, the fragility of family bonds, the lack of support for the process of autonomy, and parental monitoring are important factors that can be associated to the development of risk in adolescents^{5,6}.

Some studies have shown how risk behaviors can co-occur in the daily lives of adolescents⁷⁻⁹. It is known that determining factors for the occurrence of a risk behavior tend to encourage the simultaneous occurrence of others^{8,9}. Each risk behavior may have a different effect on health, and different risk behaviors can synergistically reflect in the development of illness⁸. In the literature, few studies analytically discuss the co-occurrence of health risk behaviors or health behaviors among adolescents^{2,8,10,11}, especially their relationship with the characteristics of the family context^{5,11}.

Therefore, the objective of this study was to assess the association between the family context and the co-occurrence of health risk behaviors among Brazilian adolescents, through the 2015 National Survey of School Health (*Pesquisa Nacional de Saúde do Escolar – PeNSE*).

METHODS

This is a population-based study considering secondary data obtained from a cross-sectional survey on schoolchildren enrolled in the 9th grade of elementary school who attended public and private schools in Brazil. Data from the third edition of PeNSE were used, which are representative of the five regions of Brazil¹². The microdata, related to PeNSE Sample 1, are available on the website of the Brazilian Institute for Geography and Statistics. PeNSE was approved by the National Committee of Ethics in Research (Conep) under opinion No. 1,006,467, on March 30, 2015.

SAMPLE CALCULATION

The PeNSE sample of schools was selected from 53 geographic strata. Of this total, 27 strata corresponded to the 26 municipalities in the capitals and the Federal District, and the remaining 26 strata, to some municipalities, outside the capitals, representing each of the federative units. The selection took place in three stages:

- municipalities or groups of municipalities (n=675);
- schools (n=3,160);
- classes (n=4,159)¹².

The crossing between geographic strata and the administrative affiliation of the school (private or public) was considered to define the sample size, according to the number of classes in the 9th grade. Schools consist in the primary sampling units and classes, the secondary units. The draw of primary sampling units within each stratum was carried out by a systematic sampling with probability proportional to the number of schools in the strata. The total number of participants was 101,534 students aged 13 years or older¹².

All students present on the day of data collection, in the selected classes, were invited to participate in the research. The answers were directly recorded by the students in an electronic questionnaire. More information about the sample calculation and the determination of the sample size is available in the study conducted by Oliveira et al.¹³

STUDIED VARIABLES

Dependent variable

The dependent variable was composed of four health behaviors: sedentary behavior, regular alcohol consumption, regular tobacco consumption, and fruit consumption. Thus, the co-occurrence of risk behavior is related to the simultaneous occurrence of at least two and at most four of these evaluated behaviors. Students were classified as follows: sedentary behavior for those who reported being seated for more than two hours a day during after-school activities^{9,14}; regular alcohol consumption for those with an intake of at least one drink of alcoholic beverage in the last 30 days; regular consumption of tobacco for those who had smoked at least one day in the last 30 days; and irregular fruit consumption for those who consumed fruits four times or less per week¹⁵.

The four surveyed risk behaviors (RB) were individually coded in a binary variable (presence of RB = 1; absence of RB = 0). The co-occurrence of RB was estimated by the sum of these four behaviors, being ranked from zero (none) to four simultaneous RB.

Independent variables

Variables related to the family context addressed by PeNSE¹² were considered to be the main explanations. They are as follows: maternal education level (none, some elementary school, elementary school and some high school, high school and some college, college); family structure (lives with father and mother, lives with father or mother, does not live with the parents); parents who understood problems and concerns (often or always, sometimes, never or rarely); parents who monitored their homework (often or always, sometimes, never or rarely); and having meals with the parents (five days or more a week, up to four days a week).

Covariables

Covariables consisted in sex, age, and income level, according to the score for goods and services (SGS), used as adjustment factors. For the creation of the SGS, the following items were used: possession of landline, cell phone, computer, internet, automobile and motorcycle, having a bathroom inside the house, and presence of a housekeeper three or more times a week. Each item previously presented received a weight, which corresponds to the inverse of the frequency of possession or presence in the total studied sample. The total score of each student was obtained by adding the weights of the respective items and categorizing them in thirds of the distribution observed in the sample¹⁶.

TREATMENT OF MISSING DATA

Of the total number of students responding to PeNSE 2015, 25% (n=25,434) did not know their mother's education level. Hence, a multiple imputation data process was implemented, which included the identification of predictive variables: sex, family goods (car, landline, cell phone, number of bathrooms at home), and services (housekeeper and internet access at home)¹⁷. The variable "paternal education level" was not included in the analysis, as it was not measured in PeNSE 2015. The Multiple Imputation by Chained Equations (MICE) method was used to assign numerical values to the "maternal education level" variable¹⁸.

DATA ANALYSIS

The prevalence of multiple RB was estimated by the sum of behaviors. The Venn diagram was used for the graphical representation of the co-occurrence of RB for the studied population. It is a method employed to compare and visualize data sets from different groups consisting of graph intersections, which represent the different groups of data sets. The prevalence of overlap and separation between graphic forms allows a visual representation of the relationships between the different RB analyzed¹⁹.

For the description of variables, the frequency distribution and their respective confidence intervals were used. The number of RB associated with the family context was assessed by bivariate analysis, and data were presented with their respective proportions for each category of the outcome.

An ordinal logistic regression model of partial proportional odds was performed to identify the family context variables associated with the number of RB. This model was adopted considering that the proportional odds assumption, also called the parallel regression assumption, was violated²⁰. Adjusted odds ratios (OR) and their 95% confidence intervals (95%CI) were estimated. All analyses were performed using the Stata 12.0 statistical software, and the complexity of the sample design was considered in all analyses.

RESULTS

Among the total participants, most were girls, 51.2% were 14 years old, and 36.6% belonged to the second tertile of the income level. As for the family context, 30.6% had mothers with high school or some college, most adolescents lived with their father and mother, 43.8% had parents who often or always understood their problems, 44.4% had parents who never or rarely monitored their homework, and 74% regularly had meals with their parents (Table 1).

The increase in the proportions of co-occurrence of three or four RB was observed for girls, aged 15 years or older, who lived with their father or mother or who did not live with their parents, and for adolescents whose mothers' education level was high school

Table 1. Sociodemographic characteristics and proportion of co-occurrence of risk behavior in relation to family context variables for Brazilian adolescents, National Survey of School Health (PeNSE) 2015.

Variables	%	95%CI	Co-occurrence of risk behaviors				p-value*
			0	1	2	3 or 4	
Sex							
Boys	48.7	48.1–49.3	48.3	50.4	48.8	44.3	<0.001
Girls	51.3	50.7–51.9	51.7	49.6	51.2	55.7	
Age (years)							
13	17.9	16.9–18.9	17.8	18.4	19.4	12.8	<0.001
14	51.2	50.3–52.1	50.2	51.5	53.1	46.0	
15	19.9	19.1–20.6	21.1	18.9	18.3	25.6	
16–19	11.0	10.4–11.6	10.9	11.2	9.2	15.6	
Income level							
1 st tertile	32.4	31.4–33.4	37.5	36.5	29.3	28.1	<0.001
2 nd tertile	36.6	35.8–37.4	34.7	35.0	38.2	37.7	
3 rd tertile	31.0	29.8–32.1	27.8	28.5	32.5	34.2	
Maternal education level							
No education	7.7	7.3–8.1	9.8	9.0	6.5	6.6	<0.001
Some elementary school	26.7	25.9–27.4	28.0	27.9	25.5	26.5	
Elementary school/Some high school	17.2	16.6–17.8	17.0	17.4	17.3	16.9	
High school/Some college	30.6	29.9–31.3	28.7	28.5	32	32.7	
College	17.8	16.8–18.7	16.5	17.2	18.7	17.3	
Family structure							
Lives with father and mother	59.3	58.5–60	62.4	62.1	59.2	51	<0.001
Lives with father or mother	35	34.3–35.7	31.9	32.3	35.5	42	
Does not live with the parents	5.7	5.5–6	5.7	5.6	5.3	7	
Parents who understand problems*							
Often/always	43.8	43.1–44.4	59.2	49	40.6	31	<0.001
Sometimes	22.8	22.3–23.3	19.9	22.3	23.9	22.6	
Never/rarely	33.4	32.8–34.1	20.9	28.7	35.5	46.4	
Parents monitoring homework*							
Often/always	31.8	31.2–32.5	52.7	31.1	27	20.3	<0.001
Sometimes	23.8	23.3–24.2	20.6	24.4	24.9	20.7	
Never/rarely	44.4	43.7–45.1	26.7	38.5	48.1	59	
Having meals with parents or guardians*							
Regularly (≥5 days/week)	74	73.4–74.7	83.5	78.5	72.1	63	<0.001
≤4 days a week	26	25.3–26.6	16.5	21.5	27.9	37	

*Pearson's test; %: frequency of the studied population; 95%CI: 95% confidence interval.

or some college. There was also an increase in the proportion of co-occurrence of RB for adolescents belonging to the second and third economic tertiles, whose parents never or rarely understood their problems and concerns, who never or rarely monitored their homework, and among those who had meals with their parents or guardians less than five days a week (Table 1).

Regarding the co-occurrence of health RB, 8.8% (95%CI 8.5–9.2) of the adolescents did not present it; 34.5% (95%CI 33.8–35.1) had one RB; 42.7% (95%CI 42.0–43.2), two; and 14.1% (95%CI 13.7–14.6), three or four.

The most frequent RB among adolescents was sedentary behavior (68.1%), followed by low fruit consumption (67.2%), regular alcohol consumption (23.4%) and, finally, tobacco consumption (5.6%). According to the Venn diagram, the most frequent intersections among RB were between sedentary behavior and low fruit consumption (33.8%) and between sedentary behavior, low fruit consumption, and regular alcohol consumption (9.5%) (Figure 1).

In the multivariate analysis, adolescents who reported having mothers with higher education level had greater odds of RB co-occurrence for the three comparison models [0 vs. 1, 2 and 3: (OR=1.29; 95%CI 1.10–1.52)]; [0 and 1 vs. 2 and 3: (OR=1.31; 95%CI 1.18–1.45)]; [0, 1 and 2 vs. 3: (OR=1.19; 95%CI 1.03–1.37)] when compared with those who had mothers with no education. Living with only one parent compared with living with both parents was positively associated with the odds of RB co-occurrence in the three analyzed models [0 vs. 1, 2 and 3: (OR=1.09; 95%CI 1.01–1.19)]; [0 and 1 vs. 2 and 3: (OR=1.21; 95%CI 1.15–1.27)]; [0, 1 and 2 vs. 3: (OR=1.36; 95%CI 1.26–1.46)] and the category “does not live with the parents” was only associated for the comparison 0, 1 and 2 vs. 3 or more RB (OR=1.21; 95%CI 1.07–1.37) (Table 2).

Having parents who sometimes, never or rarely understood their problems and concerns was associated with greater odds of RB co-occurrence [0, 1 and 2 vs. 3: (OR=1.62; 95%CI 1.49–1.76)] as well as having parents who never or rarely monitored their homework [0, 1 and 2 vs. 3: (OR=1.77; 95%CI 1.62–1.93)]. Having meals with parents or guardians irregularly was positively associated with the co-occurrence of RB in all evaluated models when compared with those who regularly have meals with them [0 vs. 1, 2 and 3: (OR=1.44; 95%CI 1.29–1.61)]; [0 and 1 vs. 2 and 3: (OR=1.39; 95%CI 1.31–1.47)]; [0, 1 and 2 vs. 3: (OR=1.43; 95%CI 1.33–1.54)] (Table 2).

DISCUSSION

This study found significant associations between the co-occurrence of health RB and family context variables for Brazilian adolescents. The chance of having a higher number of RB was higher for adolescents who reported: having mothers with higher education level; living with the father or mother, or not living with the parents; having parents who sometimes, never or rarely understood their problems and concerns and monitored their homework; and having meals with parents or guardians four days or less a week.

Consumption of tobacco and alcohol, low consumption of fruits and vegetables, and sedentary behavior are some of the behaviors related to the development of NCDs and to the increase in mortality for the world population^{1,2}. The WHO recognizes the role of the sum of risks at the primary and secondary levels of health care and indicates that the overall risk for illness is increased when multiple RB are present².

Among the analyzed behaviors, it was observed that RB, such as sedentary behavior and inappropriate food consumption, can co-occur, and the high prevalence of this co-occurrence was associated with sociodemographic, family, and behavioral factors^{10,21}. In addition, the co-occurrence of the analyzed behaviors corroborates the findings of a survey that investigated adolescents from 89 countries to determine clustering patterns. The co-occurrence of smoking habit, alcohol consumption, sedentary behavior, and low consumption

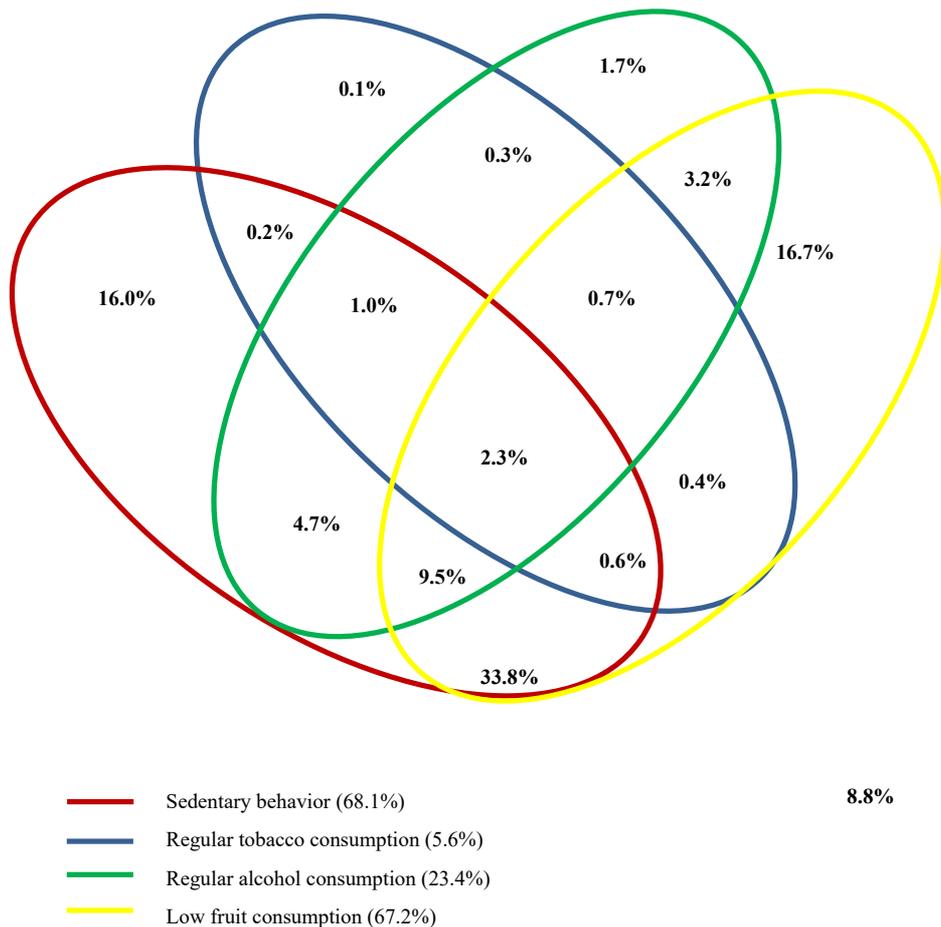


Figure 1. Co-occurrence of risk behaviors in Brazilian adolescents, National Survey of School Health (PeNSE) 2015.

of fruits and vegetables was 6.81 times higher in girls and 2.51 times higher in boys than the globally expected¹.

The adoption of RB can be linked to several factors. Among them, the social and family contexts in which these adolescents are inserted can be highlighted^{6,12,22}. A study that

Table 2. Multivariate analysis of partial odds for co-occurrence of risk behaviors and family context in Brazilian adolescents, National Survey of School Health (PeNSE) 2015.

Variables	Comparisons					
	0 versus 1, 2 and 3 or more		0 and 1 versus 2 and 3 or more		0, 1 and 2 versus 3 or more	
	OR	95%CI	OR	95%CI	OR	95%CI
Family context*						
Maternal education level						
No education	1		1	–	1	–
Some elementary school	1.22	1.06–1.40	1.25	1.14–1.37	1.25	1.10–1.42
Elementary school/Some high school	1.29	1.10–1.50	1.30	1.18–1.44	1.22	1.06–1.41
High school/Some college	1.33	1.15–1.54	1.44	1.31–1.58	1.35	1.19–1.54
College	1.29	1.10–1.52	1.31	1.18–1.45	1.19	1.03–1.37
Family structure						
Lives with father and mother	1	–	1	–	1	–
Lives with father or mother	1.09	1.01–1.19	1.21	1.15–1.27	1.36	1.26–1.46
Does not live with the parents	0.94	0.80–1.11	1.01	0.92–1.11	1.21	1.07–1.37
Parents who understand problems*						
Often/always	1	–	1	–	1	–
Sometimes	1.35	1.22–1.50	1.27	1.20–1.35	1.28	1.17–1.41
Never/rarely	1.58	1.43–1.76	1.45	1.37–1.54	1.62	1.49–1.76
Parents monitoring homework						
Often/always	1	–	1	–	1	–
Sometimes	1.87	1.69–2.07	1.48	1.39–1.58	1.29	1.16–1.43
Never/rarely	2.43	2.20–2.68	1.82	1.72–1.93	1.77	1.62–1.93
Having meals with parents or guardians*						
Regularly (≥5 days/week)	1	–	1	–	1	–
≤4 days a week	1.44	1.29–1.61	1.39	1.31–1.47	1.43	1.33–1.54

*Adjusted for sociodemographic variables (sex, age, and income level); OR: odds ratio; 95%CI: 95% confidence interval.

interviewed adolescents based on the theory of triadic influence categorized determinants by social, cultural, and intrapersonal contexts and identified that tobacco and alcohol consumption were strongly associated with parenting practices, RB of friends and parents⁶. In addition, a longitudinal research has shown that children exposed to socio-family contexts of vulnerability and violence tend to experience anxiety, depression, comorbidities, and alcohol consumption during their lives³. Thus, it is possible to understand that the social and family contexts can compose a scenario of greater vulnerability and encouragement to the adoption of multiple health RB^{6,12}.

Adolescents who reported having mothers with higher education level had a greater chance of co-occurrence of RB for the three assessed models. Higher maternal education level can also represent a higher income level, which can lead to greater family purchasing power, providing, for example, access to games, electronic devices, and unhealthy food¹⁰. One of the possible explanations is that higher education levels represent mothers who probably work outside their homes and, therefore, tend to have less control over what adolescents do in their spare time²³.

Education level, maternal occupation, and the presence of RB can have interrelationships that permeate the family structure. Regarding family structure, it was observed that adolescents who reported living with their father or mother or not living with their parents were positively associated with the co-occurrence of RB. Parents who compose the single-parent nucleus tend to be divided between supporting the household, the overload of roles, and meeting the demand for attention and the emotional and social needs that the adolescent requires²⁴. Furthermore, adolescents who do not live with their parents may be subject to fewer rules and limits, having a more permissive relationship on the part of their guardians²⁵.

It is worth noting that transitions in the family structure, which range from the intact nuclear family (composed of a couple of adults and their socially recognized children)²⁶ to the single-parent family, the reconstituted or remarried family (when one or both spouses have children from a previous relationship)²⁶, may favor the presence of RB in adolescents. Families with intact nuclei tend to present contexts of greater stability for their children when compared with reconstituted or single-parent families^{27,28}. Adolescents from families with divorced parents tend to have a negative assessment of their parents, lower perception of personal safety and self-control when compared with those from intact families^{6,29}. Nevertheless, it should be noted that relationships within the family nucleus are linked to the individuals' plasticity and suitability capacities³⁰.

Having parents who sometimes, never or rarely understood their problems and concerns was associated with greater odds of RB co-occurrence. This association can be explained by the possibility of a limited capacity on the part of the family to face and discuss, in a democratic and mature way, the problems of their children. The family context in which there is distance in the relationship between parents and children does not seem to promote an environment that favors dialogue^{29,31}. Furthermore, having good communication with parents reflects in how adolescents express their satisfaction with life and health⁶.

Schoolchildren who reported having parents who monitored their homework sometimes, never, or rarely were associated with the co-occurrence of RB. It is known that less family support for the adolescent can reflect in difficulties that are experienced and perceived in family interactions. The variation in family support interferes with the perceptions of autonomy and independence *versus* rejection, indifference, overprotection or control, which may increase the likelihood of adopting RB^{27,32}. The literature pinpoints the importance of parental monitoring, in such a way that having parents who are interested in their children's daily activities, who relate to them, and know what their children do in their spare time influences RB in adolescence and can be a protective factor concerning risk behaviors in this stage of life³¹.

Adolescents who reported having meals with their parents or guardians less frequently had a greater chance of RB co-occurrence. A previous study suggested that adolescents who usually have meals with their parents or guardians are associated with more moments of interaction between family members and greater consumption of healthy foods³³. In addition, having meals with parents represents characteristics of family conviviality and cohesion, which can have a protective effect on several RB. When adolescents have a positive relationship with their parents and experience good conviviality in the family context, a reduction in the adoption of RB is expected³¹.

Identifying RB and their association with the family context becomes important, as it allows the development of strategies for coping with problems and aggravations, such as the prevention of NCDs, in addition to contributing to the improvement of public policies on health promotion³⁴.

However, as this is a cross-sectional study, it is not possible to infer the temporal nature. Comparisons related to the co-occurrence of RB should be carefully made, considering that the research has multiple methods, different definitions and selections of RB. The investigation of only four RB may have limited the results; however, the investigated behaviors are among the main risk factors for NCDs.

All the studied behaviors were obtained from the adolescents' self-report, which can lead to underestimation or overestimation of the prevalence. Nevertheless, the self-report has been commonly used in national surveys, and PeNSE integrates a system for monitoring the health of schoolchildren that uses validated and comparable questions in relation to other international studies^{12,35}.

As for the "family structure" variable, the question refers to living with the father or with the mother, which can limit the characterization of the different possible family arrangements. The variable does not allow to address the changes occurred in the forms of family organization such as family structures composed of same-sex couples and schoolchildren who alternately live in two homes, for instance.

Finally, it is understood that the studied RB are potentially modifiable, and the present manuscript identifies, in addition to the sociodemographic variables described in previous studies, the importance and the effect of the family context on the adoption of multiple RB in this population.

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