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Factors affecting nutrition behavior among middle-class adolescents in urban area of Northern region of Brazil

Preferências nutricionais entre adolescentes da classe média de Manaus, AM (Brazil)

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Abstract

Introduction

Brazil has been called a nation in nutrition transitional because of recent increases in the prevalence of obesity and related chronic diseases. With overweight conditions already prevalent among middle-income populations, there exists a need to identify factors that influence nutrition behavior within this group.

Objective

To address this subject, a research study was implemented among middle-class adolescents attending a large private secondary school in Manaus, Amazonas, Brazil. The study determined the availability and accessibility of snack foods as well as subjects' attitudes and preferences towards, and the influence of family and friends on healthy (high-nutrient density) snack choices.

Methods

The 4-stage process included: (a) a nutrition expert focus group discussion that reported local nutrition problems in general and factors related to adolescent nutrition, (b) an adolescent pilot survey (n=63) that solicited information about snacking preferences and habits as well as resources for nutrition information and snack money; (c) a survey of various area food market sources to determine the availability and accessibility of high nutrient density snacks; and (d) a follow-up adolescent survey (n=55) that measured snack food preferences and perceptions about their cost and availability.

Results

Results included the finding that, although affordable high nutrient density snacks were available, preferences for low nutrient density snacks prevailed. The adolescents were reportedly more likely to be influenced by and obtain nutrition information from family members than friends.

Conclusion

From study results it is apparent that a focus on food availability will not automatically result in proper nutritional practices among adolescents. This fact and the parental influence detected are evidence of a need to involve adolescents and their parents in nutrition education campaigns to improve adolescent snack food choices.

Adolescent nutrition. Social class. Food preferences.

Resumo

Introdução

O Brasil tem sido considerado um País em transição nutricional em razão dos recentes aumentos na prevalência de obesidade e doenças crônicas na classe média, sendo importante identificar os fatores que influenciam as preferências nutricionais desse grupo. Foi realizado estudo com estudantes de classe média de um colégio secundário, particular, em Manaus, AM, Brasil. Com o objetivo de determinar a disponibilidade e a acessibilidade das merendas e analisar as atitudes e preferências dos estudantes e a influência de vários fatores na escolha de merendas nutritivas.

Métodos

O estudo incluiu quatro fases: (a) discussão em um grupo de especialistas em nutrição sobre a disponibilidade e acessibilidade das merendas em Manaus; (b) inquérito junto a um grupo dos adolescentes (n=63) sobre suas preferências e hábitos nutricionais; (c) inquérito junto a supermercados selecionado para identificar a disponibilidade e acessibilidade das merendas preferidas; (d) um grupo acompanhado de uma subamostra dos adolescentes (n=55) para identificar a preferências e atitudes sobre o custo e disponibilidade das merendas.

Resultados

Foi constatado que os estudantes possuíam condições financeiras para comprar merendas e que as merendas nutritivas não custam mais do que as não nutritivas. A preferência dos adolescentes foi por merendas não nutritivas. Os fatores que, principalmente, influenciam na escolha originam-se da família e da televisão.

Conclusão

As implicações para futuras pesquisas e programas nutricionais são discutidos, recomendando-se campanha de educação nutricional para famílias, visto a importância desta na escolha de merendas entre esses adolescentes.

Nutrição do adolescente, fisiologia. Classe social. Preferências alimentares.

INTRODUCTION

Malnutrition has historically been a primary health risk factor in Brazil^{8, 14, 18}. Efforts to alleviate the problem have predominantly targeted low-income groups with government food production and supplement programs as well as employee and school lunch programs^{6, 8, 14, 17, 18}. Yet, it was recently noted that Brazil is "rapidly shifting from the problem of dietary deficit to one of dietary excess"¹³. Obesity is now prevalent among Brazil's middle-income group and is rapidly increasing among the poor^{13, 20}.

Monteiro et al.¹³ attribute this "nutrition transition" to economic and lifestyle shifts that have occurred in Brazil over the last three decades. An increase in the 1980s of two-income families¹⁵ contributed to an emerging Brazilian middle class, the group in which obesity is presently most prevalent¹³. Obesity is also more prevalent among urban than rural populations²⁰, a phenomenon that is probably influenced by differences in economic status. Yet income can no longer be considered the sole contributing factor in that the greatest increase in obesity over the past two decades was among low-income women¹³. And, at high income levels, men were found to be at greater

risk of obesity than women and younger men experienced a more rapid increase than older men²⁰. These findings suggest that factors other than income also contribute to obesity.

The Brazilian transition pattern mimics that of other developing countries where improved government efforts toward education, food supplies, sanitation and health services typically result in reduced infectious disease-related morbidity/mortality rates and increased proportions of deaths due to chronic diseases^{4, 16, 19, 21}. Although infectious disease prevalence continues in Brazil; immunization, total life expectancy, and chronic diseases have significantly increased^{4, 19}. Chronic disease increases are commonly associated with obesity, high-fat/low-fiber eating patterns and sedentary lifestyles^{20, 21, 24} and, where obesity is concerned, Brazil is no exception¹³. A call has arisen for closer assessment of the factors leading to overweight conditions^{13, 20}. And, because the condition is most prevalent among the middle class and begins among younger age cohorts^{9, 13, 20, 22, 23, 25} nutritional habits developed during childhood and adolescence are often carried into adulthood^{1, 22}. Youth-induced obesity is often related to adult-onset diseases⁷. Thus research involving this group may be the best place to start.

A first step in developing nutrition intervention strategies that will halt the diet-obesity-chronic disease pattern is to identify factors that influence eating patterns among those at greatest potential risk, middle-class adolescents. A clear understanding of all factors that contribute to obesity requires a careful analysis of related attitudes, beliefs, and behaviors prevalent in the targeted population; the availability and accessibility of needed resources and information; and the nature and extent of influence exerted by sociocultural, economic, political and physical environments¹¹.

It has been found that teenagers habitually snack on the same high-fat snacks over time with little regard for health-related nutrient needs²⁵. The primary motivator in snack choices appears to be taste with high salt content serving as a major taste factor²⁵. Due to nutritional needs for body development, nutrition experts do not generally recommend putting adolescents on low-fat, calorie-restricted diets²⁵. In fact, peer pressure about appearance and body size sometimes motivates adolescents to self-restrict needed nutrients, a practice which can lead to negative health consequences^{2, 7, 9, 12}. Thus, many nutrition educators recommend that appropriate snacking, rather than caloric restriction be the focus of adolescent nutrition education²⁵.

Two important nutritional components commonly lacking in the adolescent diet are fiber and calcium while an excess of sodium and saturated fat is commonly evident^{7, 25}. Therefore, an appropriate dietary change would be to replace frequently preferred high-fat/high-sodium snacks (e.g., chips, candy, and sodas) with high-fiber (e.g., cut raw vegetables, fruit, and popcorn) and low-fat/high-calcium (e.g., low-fat frozen yogurts, milk and cheese) snack choices^{3, 7, 25}.

While this replacement strategy appears to be simple, the challenge of nutrition education and dietary change among adolescents is great. The purpose of this study was to identify factors that influence food choices of middle-class adolescents for whom income was not a major barrier to nutrient intake. Study results provided guidelines for future nutrition education among potentially obesity-prone populations in Brazil.

MATERIAL AND METHOD

In societies where food is readily available, frequent intake of high-fat/low-fiber snacks is commonly associated with obesity. For this reason, methods used in this study were designed to determine the availability and accessibility of snack foods as well as subjects' attitudes and preferences

toward and the influence of family and friends on healthy (high-nutrient density) snack choices. Figure 1 illustrates the study procedures. The results of the nutrition expert focus group and the food market source comparisons are described in the methods section as part of an explanation of the research process. Findings derived from the adolescent food sources and influences survey (N=63) and snack preferences and expense assumptions survey (N=55) are described within the results section.



Figure 1 - Study procedures.

The translation of all written research materials into Portuguese was tested utilizing the technique of back-translation^{5, 10}. In this process one bilingual person translated the researcher's original English version of the material into Portuguese. A second translator, with no assistance from the original English version, then translated the resulting Portuguese version back into English. Discrepancies between the two English versions were discussed and the process continued until cultural equivalency (equivalency in meaning rather than words or phrases) was established.

Choosing a Sample Population

The first step of the study was to identify a group of adolescents for whom income was not a major barrier to nutrition. A large private secondary school (n=389) in Manaus, the seagoing port and capital of Amazonas, was selected as the study site. According to school officials,

approximately 20% of students enrolled were able to pay full tuition and could be considered representative of higher income families. Another 20% were on full scholarship indicating some economic need for financial support. The remaining 60% were on various levels of partial loan and/or scholarship programs. School officials considered all students enrolled as representatives of families for whom income would not be a major nutrition barrier. Verification of this perception as well as consideration of other factors regarding food availability and accessibility were in order. Methods related to the research of these factors are described below.

Determining Food Availability and Accessibility

Nutrition Expert Focus Group

To determine the availability and accessibility of snack foods in the Manaus area, the researcher first met with members of the "Associação de Nutricionistas do Amazonas", the state association of nutrition experts based in the city (Figure 1). Local nutrition problems in general and factors related to adolescent nutrition were discussed. The group explained that, because many food products were imported into Manaus from other regions, fluctuations in the shipping industry affected food cost (accessibility) and availability. It was suggested that finding readily available and affordable high nutrient density snacks in Manaus would be a challenge. A list of such items was generated and market sources identified. Three common Manaus food sources were named: large in-door supermarkets, open-air fruit and vegetable markets, and small neighborhood grocery outlets commonly referred to as "Japonesas". It was clearly evident that close scrutiny of the targeted adolescent group's common food sources and the availability and accessibility of food snacks from those sources would be critical to understanding adolescents' snacking preferences and the beliefs that influenced them.

First Adolescent Survey (N=63): Snack Food Sources and Influences

The next step was to identify specific snack food sources common to the targeted adolescent group. Information about their snacking habits and who influenced them was also needed. To accomplish this, a survey of 63 eleventh graders enrolled in the targeted school was implemented. The students were first asked to respond individually to a written survey that asked: (a) what were their most favorite and frequently chosen snacks and beverages; (b) under what circumstances and with whom did they snack most often; and (c) what/who was the source of most of their nutrition-related information and money for snacks.

In the first section of the survey, the students were asked to list their favorite and most frequently consumed snack foods and beverages. The availability and accessibility of these items from designated food sources would be the subject of further study. The second section of the

written survey contained 7 items measuring the students' perceptions of snacking-related influence from selected individuals and groups (see Table 1 for items). In this section, the respondent was asked to complete each statement (e.g., "When it comes to influencing my snack food choices, my mother is:") by circling one of three possible statement endings (not important, important, very important).

In the third section of the survey, 15 items identified where, when and with whom the students most often snacked (see Table 2). For each item, a statement was provided (e.g., "I eat snacks with my friends at school.") and the respondent was asked to circle one of five possible response choices (very often, often, sometimes, seldom or never).

Six survey items (see Table 3) helped identify common sources of snacking information. As with the previous survey section, statements were provided (e.g., "I get information about snack foods from my family:") for which one of five response choices was possible (very often, often, sometimes, seldom or never).

Three survey items asked respondents to indicate how frequently they had money to buy snacks and how frequently they and their parents paid for their snacks. Those items included the statements "I have money to buy snacks.", "My snack money comes from my parents." and "I use my own money to buy snacks.". Each statement was followed by the response choices of "very often, often, some times, seldom and never". Following completion of the survey, the researcher involved respondents in open discussion about their snacking habits and sources of information for further clarification of common snack food sources. The next research step would involve a closer look at these sources and what they offered.

Food Market Comparison

A random selection of four Manaus supermarkets, two open-air fruit and vegetable markets and two Japonesas were visited within a one-week period to note available high- and low-density food snacks. Because the adolescents indicated that the bulk of food shopping occurred in supermarkets, a greater number of these were included in the study.

In advance of market visits, a list of high and low nutrient density snack food items was created based on the food item availability list compiled by the nutrition experts and the "favorite/frequent snacks" listed individually in the 63-student survey. During market visits, snack items on the list that were unavailable or cost more than those listed by the 63 students were eliminated and other, comparably-priced items found in the markets were added to the list. Cross-market comparisons revealed that prices for each item were virtually the same in all places. The result was a list of snack food items deemed available and economically accessible to the targeted adolescent group. This list would be used to develop a scale measuring snack food preferences and related expense assumptions among adolescents enrolled in the targeted school.

Second Adolescent Survey (n=55): Snack Preferences and Expense Assumptions

A 44-item snack food preference scale (Cronbach alpha=.84) was administered to a different subsample of adolescents (n=55) enrolled in the targeted school. Scale content was based upon previously described results from the nutrition expert focus group, 63-student survey and food market comparison. In each of the 44 items, a high and a low nutrient density food snack were paired with equivalencies considered regarding price (accessibility), availability and, where possible, snack type (e.g., packaging, flavor, need for refrigeration, large versus small-bite pieces). In each item, the respondent was asked to state a preference for either the high or low density food snack or mark a neutral response ("I like them both the same.").

Fully-written responses were used in the 3-point multiple choice scale to facilitate ease of comprehension. To avoid possible response order bias, half of the items (randomly selected) presented the food choice of high nutrient density first (response 'a'). For these items, the food choice of low nutrient density was response 'c'. Response 'b' contained a neutral response for all items. An example follows:

I like:

- (a) bananas better than banana cream cookies.
- (b) them both the same.
- (c) banana cream cookies better than bananas

In the remaining half of scale items the order was reversed so that response 'a' presented the low nutrient density food choice, 'b' the neutral response, and 'c' the high nutrient density food choice:

I like:

- (a) soft drinks better than natural fruit juices.
- (b) them both the same.
- (c) natural fruit juices better than soft drinks.

Items were placed in random order so that no more than three items with the same response format (e.g. high nutrient density choice first) appeared consecutively. When the scale was complete and a culturally equivalent translation developed, a second version with the same food pairings was created but with response choice orders for each item reversed (i.e., items that listed the high-nutrient density item first now listed the low nutrient density item first and vice versa). Other samples of the 44 food pairings include milk and coffee, apples and candy bars, orange soda and orange juice, frozen yogurt and ice cream, carrot sticks and french fries.

On the 44-item snack food preference scale, each respondent was assigned 2 points for each item in which the high nutrient density food choice preference was selected and 1 point for each "I like them both the same" response. (This neutral response scoring decision was based on the assumption that an equal liking of the two choices rendered a high nutrient density choice more likely than did a clear preference for the low nutrient density snack.) Zero

points were awarded for a low nutrient density preference. The possible response score range was 0-88 with a score of 0-28 representing a low score (low nutrient density preference), 29-57 representing a medium score, and 58-88 a high score (high nutrient density preference).

Assumptions about Expense

The previous discussion with the pilot survey of 63 adolescents revealed that assumptions about snack food costs could strongly affect snack food choices in an environment where imported foods sometimes affected availability and accessibility. One concern was that mistaken assumptions about snack food prices could affect snack food preferences. For this reason, a second 20-item expense assumption scale (Cronbach alpha=.80) was developed to accompany the 44-item snack food preference scale. This second scale measured beliefs about cost equivalency among randomly selected high- and low- density snack food pairings used in the 44-item snack food preference scale. For each item, the respondent was asked to indicate whether he/she believed the high nutrient density snack food was more expensive than the low nutrient density snack food, the reverse was true, or they cost about the same (e.g., I think that: (a) frozen yogurt is more expensive than ice cream, (b) ice cream is more expensive than frozen yogurt, (c) they cost about the same.)

Because all pairings were deemed in previous research to be comparably priced, the only correct answer for each item was "(c) they cost about the same". However, a greater barrier to appropriate snack choices would exist if the mistaken assumption about price differences deemed high nutrient density snacks to be more expensive. Thus, careful scrutiny of the direction of mistaken assumptions would also be important.

RESULTS

As described above, the study methods involved a 4-step process (nutrition expert focus group, adolescent snack food sources and influences survey, food source comparison survey, adolescent attitude and food preference survey). The results of the nutrition expert focus group and the food market source comparisons were described in the methods section as part of an explanation of the research process. Described here are the results of the two adolescent surveys used to identify sources and influences (first survey, N=63) and snack preferences and expense assumptions (second survey, N=55).

Snack Sources and Influences Survey Results

In the first adolescent survey (N=63), a clear majority of students listed pastries as one of their favorite snacks. As shown in Figure 2, the only high

nutrient density snack listed was fruit. Every respondent named soft drinks as a favorite beverage and a large percentage listed “sucos”, fruit juices commonly mixed with large amounts of sugar.

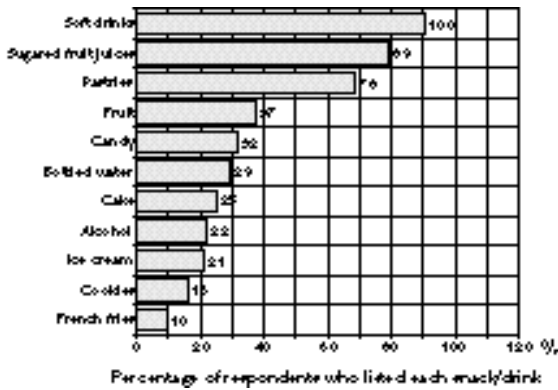


Figure 2 - Preferred snacks/drinks: percentage of frequencies (n=63).

Table 1 contains response frequencies regarding the level of influence the adolescents believed to be exerted upon their snacking choices by various people. Responses indicated that mothers in particular (very important + important=78%) family members in general (65%) and fathers (64%) exerted a greater degree of influence upon student food snack choices than other individuals and groups. Friends in general (37%) and best friends (35%) were the second most influential. Nutrition teachers (13%) and teachers in general (8%) were deemed the least influential regarding snack food choices.

As indicated in Table 2, respondents reported snacking most frequently at night, when doing homework, and while traveling. Although 44% reportedly snacked with their friends at night, responses indicated a greater tendency to snack with family (at night, while at parties, on weekends and while watching T.V.) than with friends. The two most commonly

Table 1 - Snacking habits: importance of influencers for snack choices (N=63).*

Survey Item	VI	Imp	NI
1. When it comes to influencing my snack food choices, my mother is:	40	9	14
2. When it comes to influencing my snack food choices, my family in general is:	32	9	22
3. When it comes to influencing my snack food choices, my father is:	30	10	23
4. When it comes to influencing my snack food choices, my friends in general are:	8	15	40
5. When it comes to influencing my snack food choices, my best friend is:	5	17	41
6. When it comes to influencing my snack food choices, my teachers in general are:	0	8	55
7. When it comes to influencing my snack food choices, my nutrition teachers are:	3	2	58

* VI: Very Important, Imp: Important, NI: Not Important

Table 2 - Snacking habits: frequency of where, when and with whom they snack (N=63).*

Survey Item	VO	Oft	Som	Sel	Nev
1. I eat snacks with my friends at school.	7	16	23	17	1
2. I eat snacks with my family at home.	5	9	16	22	11
3. I eat snacks with my friends after or before school.	5	8	16	23	11
4. I eat snacks with my family at night.	27	25	9	3	0
5. I eat snacks with my friends at night.	25	19	16	4	2
6. I eat snacks with my family while watching television.	11	12	26	13	1
7. I eat snacks with my friends on weekends.	12	12	22	11	6
8. I eat snacks with my family on weekends.	16	11	22	5	0
9. I eat snacks with my friends at parties.	9	17	22	14	1
10. I eat snacks with my family at parties.	11	19	23	9	2
11. I eat snacks while shopping.	9	13	13	16	12
12. I eat snacks for lunch.	3	4	16	22	18
13. I eat snacks while on trips.	23	20	10	7	5
14. I eat snacks when I am alone.	17	27	15	6	0
15. I eat snacks when I am doing my homework.	19	28	12	6	0

* VO: Very Often, Oft: Often, Som: Some Times, Sel: Seldom, Nev: Never

Table 3 - Sources for nutrition information (N=63)*

Survey Item	VO	Oft	Som	Sel	Nev
1. I get information about snack foods from my family.	37	20	5	1	0
2. I get information about snack foods from television.	29	23	4	5	2
3. I get information about snack foods from friends.	12	22	12	11	6
4. I get information about snack foods from school.	16	18	19	8	2
5. I get information about snack foods from magazines.	15	13	10	7	18
6. I get information about snack foods from radio.	4	2	9	20	28
7. I get information about snack foods from newspapers.	1	4	7	5	46

* VO: Very Often, Oft: Often, Som: Sometimes, Sel: Seldom, Nev: Never

cited sources for nutrition information (Table 3) were family (very often or often for 91% of respondents) and television (83%). Friends (54%), school (54%) and magazines (44%) were also named. Radio (10%) and newspapers (8%) appeared to be the least common source for nutrition information. Responses indicated that 82% often or very often had money available to buy snacks. Snacks were more commonly bought by the students' parents (100% said often or very often) than by the students themselves (45% sometimes, 10% seldom, 45% never).

In the focus group discussion conducted following survey completion, the adolescents' oral responses supported written answers in that parents and family were named as the primary sources of snacking information, buyers of snacks, and influencers of student snacking choices. The students named the same three food snack sources (supermarkets, open-air fruit and vegetable markets, and local "Japonesas") as did members of the nutrition expert group. When asked to identify the source most frequently shopped, students agreed that all three were consistently used but the large super markets provided the greatest bulk of food snack purchases.

Snack Preferences and Expense Assumptions: Survey Results

On the 44-item snack preference scale the group's (N=55) mean score was 50.0 (sd=9.46), a score that fell within the medium score range (n=45). No individual respondent scored within the low score range that would have indicated a general preference for low nutrient density snacks. Only 10 respondents scored in the high score range that indicated a general preference for the high nutrient density snack choices.

No statistically significant associations were found between assumed expense and snack preference. It was noted, however, that respondents were most likely to deem the high nutrient density choices more expensive (56% of total responses), somewhat likely to be-

lieve the low-nutrient density snacks cost more (32%) and least likely to assume that paired high and low nutrient density snacks were cost equivalent (12%).

DISCUSSION

The school administrator's perceptions regarding the students' financial abilities were confirmed in the pilot study. As predicted, respondents indicated that money to buy snacks was frequently available from their parents, their primary monetary source. In addition, despite perceptions to the contrary among nutritionists and students, high nutrient-density snacks, comparably priced to popular low-nutrient density snacks, were available in the area.

Misperceptions among professionals could serve as critical barriers to nutrition program policies and educational content and, among the adolescents, would weaken motivation to seek high nutrient-density snack choices. For these reasons, nutrition education efforts should begin with a survey of available and accessible foods followed by efforts to educate the public about their low-cost existence.

The adolescents indicated that their families were their primary sources of nutrition information and mothers in particular had the greatest influence upon their snack choices. This would seem logical because the subjects were more likely to snack at home with the family than elsewhere with friends, and because parents were named as the primary source for snack money. These findings suggest that adolescent nutrition education programs would probably be more effective with an added educational component that targets parents.

In the first adolescent survey, respondents tasted their favorites snacks and beverages. Of the five snacks most frequently listed, only one (fruit) would be considered a low-fat/high fiber high nutrient-density snack. And, while almost a third of respondents (29%) listed, bottled mineral water as one of their favorites, the overwhelming majority showed a clear preference for carbonated soft drinks (100%)

and fruit juices with high-sugar content (89%). This preference for low nutrient-density snacks was mirrored in the second study and emphasizes a need for innovative, appealing approaches to introducing high-nutrient density snacks.

An additional study finding was the emergence of procedures that may be critical to ongoing research regarding nutrition behavior. As the study progressed, it became evident that perceptions as well as real food costs exert equally critical influences upon nutrition behavior. Thus, education efforts that address these perceptions may be an important component of effective nutrition intervention programs. Secondly, this study suggests that it is unwise to assume that peer pressure is the most powerful predictor of adolescent behavior. Close scrutiny of the strengths of family and peer persuasion should be an integral part of any study that seeks to measure adolescent decision-making and its antecedents.

From study results one can conclude, that, all other things being equal, this Brazilian adolescent group is just as likely to choose a low as a high nutrient density snack food. This supports the argument that providing adequate income alone will not necessarily result in proper nutritional practices⁸. Other behavior-influencing factors should be addressed when designing nutrition education programs.

The study also demonstrates a need for preliminary assessment activities prior to the design and implementation of a nutrition education intervention. These efforts should identify locally available low-cost, high nutrient-density snack alternatives and the psychosocial factors that influence the use of these snacks (e.g., perceptions about cost/availability, influences from family/friends). Subsequent nutrition education programs should then be tailored to introduce available high-nutrient density snacks in an attractive,

appealing manner. Further research is needed to determine factors that affect snack choice appeal. Some suggestions include exploring the impact of taste, packaging and ease of use as well as potential benefits related to energy potential, weight management and other health-related factors. Influential factors verified through research could then be applied to advertising available high-nutrient density snacks through school poster campaigns, snack coupon distributions and taste-test events.

It may also be concluded from this study that influences upon adolescent snacking behavior may differ from some other aspects of adolescent behavior in that parents appear to exert greater influence than peers upon food snack preferences and are more likely to serve as a nutrition information source than peers or teachers. This suggests a need to involve parents and families in nutrition education campaigns rather than only target individual students in the secondary school classroom. The efficacy of various inclusion methods must first be verified through research. However, possibilities include the creation of a health-related newsletter sent home to parents that contains nutrition education information; the offer of free evening classes for parents interested in learning about healthy meal planning, bargain shopping, cooking and weight management; the creation of a weight management support group for parents that includes proper weight loss strategies, nutrition education and how to help families maintain a nutritionally balanced diet.

These findings do not diminish the need to consider income when developing nutrition interventions. It does, however, provide guidelines for nutrition education and research that go beyond financial considerations. And, in doing so, it provides one further step towards the critical effort needed to reduce the onslaught of obesity-related chronic disease in Brazil.

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