

FLAVORED MILK IN PERSPECTIVE

INTRODUCTION

Many varieties of flavored milks, including chocolate, strawberry, vanilla, banana, black raspberry, blueberry, root beer, cappuccino, and coffee, are available (1,2). Chocolate milk, however, has long been the most popular flavored milk consumed (2). Flavored milks are available in whole to nonfat varieties, but growth in flavored milk sales during the past decade has been predominantly in reduced, low, and nonfat varieties (3).

In general, flavored milks are milks to which a sweetened flavors such as cocoa or cocoa powder, strawberry or vanilla extract has been added, along with a sweetener such as sucrose or high fructose corn syrup (4). Federal standards for pasteurization, vitamin addition, milk solids, and milk fat levels are the same for flavored and unflavored milks (4).

Flavored milks, particularly chocolate, are well liked, especially among children and adolescents (2,5). According to a recent survey of 12,000 individuals regarding their usage of flavored milks, children under the age of 12 and adolescents were the most frequent users of flavored milk (2). About one-third of children aged 9 to 11 agreed that they would drink more milk if it were chocolate (2). This finding is similar to that of an earlier national survey in which 39% of children 8 to 13 years agreed that they would drink more milk if it were chocolate (5). Children are more likely to drink flavored milk on a regular basis at school than at home (2,5).

Despite the wide variety of flavored milks in the marketplace and the popularity of these beverages, especially among children, some parents, teachers, school food service directors, and school principals express concern about the nutritional and health benefits of flavored milks for school-aged children. Some are of the opinion that flavored milks are not as nutritious as unflavored white milk and that certain components in flavored milks such as added sugars may be detrimental to children's health and behavior. This report examines the latest scientific research related to the nutritional and health benefits of flavored milk, particularly chocolate milk, and helps to put myths regarding flavored milks into perspective.

Nutrient Contribution of Flavored Milks

Like unflavored milks, flavored milks are nutrient dense foods containing a high proportion of nutrients in relation to their energy content (6, Table 1). Flavored milks have an excellent nutritional profile, providing significant amounts of high quality protein, calcium, riboflavin, magnesium, phosphorus, niacin equivalents, vitamin B₁₂, vitamin A, and, when added, vitamin D, as well as several other essential nutrients (6).

A comparison of the nutrient content of chocolate milk and unflavored milk at various fat levels reveals similar levels of most nutrients (Table 1). The main difference is chocolate milk's higher total carbohydrate content due to the addition of sucrose and/or high fructose corn syrup and consequently its higher energy (calorie) content. Chocolate milks contain about 2 to 4 teaspoons more sugar and about 60kcal more energy per 8-ounce servings than their unflavored counterparts (6). Also, a serving of chocolate milk contains slightly more fiber and iron than a serving of unflavored milk.

Table 1.
Nutrient Content of Unflavored and Chocolate Flavored Milk (expressed in amount per 8 oz serving) (6)
Milk

Nutrients	Whole, 3.3%		Lowfat, 2%		Lowfat, 1%	
	Unflavored	Chocolate	Unflavored	Chocolate	Unflavored	Chocolate
Energy, kcal	150	208	121	179	102	158
Protein, g	8.03	7.92	8.12	8.02	8.03	8.10
Total lipid, g	8.15	8.48	4.68	5.00	2.59	2.50
Total Carbohydrate, g	11.37	25.85	11.71	26.00	11.66	26.10
Fiber, g	0	2.0	0	1.25	0	1.25
Ascorbic acid, mg	2.29	2.28	2.32	2.30	2.37	2.32
Thiamin, mg	0.093	0.092	0.095	0.092	0.095	0.095
Riboflavin, mg	0.395	0.405	0.403	0.410	0.407	0.415
Niacin, mg	0.205	0.313	0.210	0.315	0.212	0.318
Pantothenic acid, mg	0.766	0.738	0.781	0.748	0.788	0.755
Vitamin B ₆ , mg	0.102	0.100	0.105	0.102	0.105	0.102
Folacin, mcg	12	12	12	12	12	12
Vitamin B ₁₂ , mcg	0.871	0.835	0.888	0.847	0.898	0.855
Vitamin A, IU	307	302	500	500	500	500
Calcium, mg	291	280	297	284	300	287
Iron, mg	0.12	0.60	0.12	0.60	0.12	0.60
Magnesium, mg	33	33	33	33	34	33
33 Phosphorus, mg	228	251	232	254	235	256
Potassium, mg	370	417	377	422	381	426
Sodium, mg	120	149	122	150	123	152
Zinc, mg	0.93	1.02	0.95	1.02	0.95	1.02

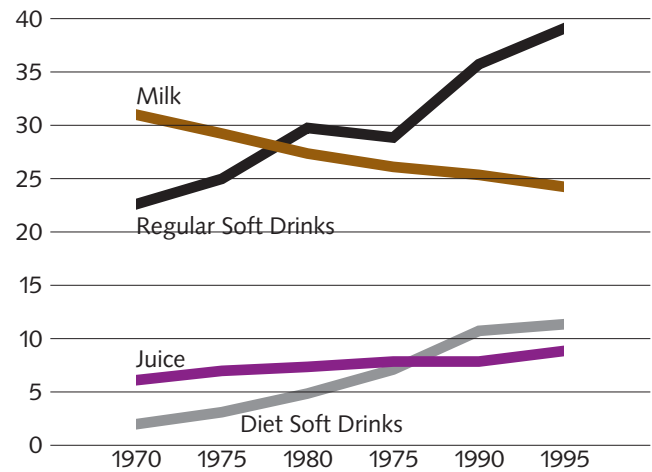
Milk and dairy products, including flavored milks, are the major source of calcium in the diet and account for 72% of the calcium available in the U.S. food supply (7). Each 8-ounce serving of chocolate milk provides 35% of the 800mg of calcium recommended for children ages 4 through 8, 23% of the 1,300mg calcium recommended for individuals 9 through 18 years, 30% of the 1,000mg calcium recommended for adults 19 through 50, and 25% of the 1,200mg calcium recommended for adults 51 years of age and older (6,8).

Government data indicate that many population groups fail to meet their daily calcium recommendations as set by the National Academy of Sciences (8,9). For example, 70% of preteen girls and 60% of preteen boys ages 6 to 11, and nearly 90% of teenage girls and almost 70% of teenage boys age 12 to 19 fall short of meeting their calcium needs (8,9). Consuming an adequate intake of calcium throughout life helps to reduce the risk of bone fractures in childhood and adolescence and osteoporosis in later adult years (10-12).

Recognizing children's low calcium intake, the American Academy of Pediatrics issued a policy statement urging pediatricians to recommend milk, cheese, yogurt, and other calcium-rich foods for children's daily diets to help build their bone mass and prevent rickets (11). This policy statement recommends that children meet their calcium needs from food first, because eating patterns developed during childhood tend to be followed throughout life. Other experts agree that the best way to meet calcium needs is to consume foods naturally containing calcium (13,14). Chocolate and other flavored milks are foods that naturally contain high levels of calcium. Because dairy foods such as chocolate and other flavored milks provide essential nutrients important for health, their intake improves the overall nutritional adequacy of the diet (13,14).

One factor that has contributed to low calcium intake is the change in beverages available in the U.S. food supply over the past few decades (15, Figure 1). As shown in Figure 1, in 1970 there was far more milk than regular soft drinks available in the U.S. food supply. However, by 1995, the availability of regular soft drinks greatly exceeded that of milk (15). Although the availability of juice has not declined, soft drinks have grown at a much higher rate than juice (15).

Figure 1.
Beverages Available in the U.S. Food Supply
(Gallons/Person/Year) (15)



Vitamin D-fortified flavored milk, as well as the unflavored version, is an important source of vitamin D. This vitamin enhances the body's absorption of calcium and helps to prevent rickets, a bone-weakening disease caused by vitamin D deficiency. Although rickets was virtually eradicated in the U.S. by the 1960s following vitamin D fortification of cow's milk, this disease is experiencing a resurgence in appearance in young children (16,17).

Offering flavored milk as part of school meal programs such as the National School Lunch Program (NSLP) and the School Breakfast Program (SBP) has been shown to increase milk and nutrient intake (18-20). When approximately 400 elementary school children in Pennsylvania were provided with an option of chocolate milk in school meals, more milk was consumed and intake of nutrients such as calcium and riboflavin increased (18). Likewise, when 6th grade students in an elementary school in New York City were provided with 1% fat chocolate flavored milk as part of the NSLP, children's milk and nutrient (e.g., calcium, riboflavin, phosphorus) intakes increased (20).

A relatively new approach to increase students' milk and nutrient intake is to provide low and nonfat milks, including flavored milks, in school vending machines (21). Although chocolate milk has been found to be the preferred flavor, tastes vary geographically. For example, in Boston, coffee flavored milk accounted for 30% of the school vending machine milk sales (21).

Health and Behavioral Concerns Related to Flavored Milk Components

Sweeteners

Flavored milks generally contain more sucrose and high fructose corn syrup than their unflavored counterparts. Some parents and others attribute these sweeteners to a myriad of problems such as dental caries, behavioral disorders (e.g., hyperactivity, learning problems, and antisocial behaviors), obesity, and diabetes. However, scientific evidence fails to support these allegations, with the possible exception of dental caries (22-26). A task force of scientists convened by the Food and Drug Administration found no conclusive evidence that sugar in the average American diet or any specific food causes health or behavioral problems (22).

Likewise, a workshop on the evaluation of the nutritional and health aspects of sugars led to the conclusion that “many alleged adverse health effects of sugars are without scientific foundation” (24). Based on a review of sugars and health, one researcher concluded, “. . . there is no association between current consumption levels [of sugar] and chronic or other diseases except dental caries” (25).

The 2000 Dietary Guidelines for Americans (27) recommends that all healthy Americans 2 years of age and older choose beverages and foods to moderate their intake of sugars. It is important to appreciate that although flavored milks such as chocolate milk contain added sugar, these beverages make a very small contribution to total sugar intake. Major sources of added sweeteners in Americans’ diets include soft drinks, sugar/sweets, sweetened grain products, and regular fruit drinks (28,29). Taken together, the above provide almost three-quarters (72%) of total sugar intake (28).

Flavored milk contains added sugars, but is rich in calcium and eight other essential nutrients. Recognizing this fact, researchers stated that “. . . it is important to ensure that nutrition education messages discouraging consumption of added sweeteners do not inadvertently discourage consumption of more calcium-rich foods [e.g., chocolate milk] within this category” (28).

- **Dental Caries.** Foods containing sugars (and other fermentable carbohydrates) can contribute to tooth decay (25-27,30,31). However, the amount of sugar alone is not the only or primary determinant of caries development. Many factors in addition to sugar intake influence caries (25-27,30-34). For example, a susceptible tooth surface, the presence of specific microorganisms, particularly mutans *Streptococci*, in the oral cavity, and sufficient time

or duration of exposure to fermentable carbohydrates all must be present for caries to develop (32-34). In contrast, fluoridated water and toothpaste, proper oral hygiene, and regular dental care can help prevent dental caries (32-34). A recent investigation found that sugar intake was not associated with caries in British preschool children who brushed their teeth twice a day or more (35).

Chocolate milk’s moderate amount of sucrose is no more likely to cause dental caries than other sugars such as lactose in milk. The chocolate flavoring in chocolate milk adds about 3.5 teaspoons of sucrose per 8-ounce serving, whereas a 12-ounce serving of a regular soft drink contain 10 teaspoons of added sugar (29). How frequently sugar or sugar-containing foods are consumed and how long they remain in the mouth determine sugar’s ability to promote tooth decay (27,31-34). Because flavored milk, being a liquid, is rapidly cleared from tooth surfaces, it may be less likely to cause tooth decay than carbohydrate-containing solid foods that adhere to tooth surfaces (30-34).

Milk, including flavored milk, also contains components that may protect against dental caries (32,36-41). Researchers at the University of Rochester in New York found that 2% fat milk containing as much as 10% added sugar (i.e., the amount in chocolate milk) is no more cariogenic than 2% fat milk without sugar (36). The finding that 2% fat milk with 10% added sugar is less caries-promoting than water with 10% sucrose indicates that components in milk may be protective (36,37).

According to the American Academy of Pediatric Dentistry (42), “there is evidence that foods containing milk casein, calcium, phosphorus, and cocoa, all of which are found in chocolate milk, may be less likely to contribute to dental caries than sucrose alone or other snack foods.” Some early studies found that cocoa powder is noncariogenic (38,39). At present, evidence indicates that flavored milk, including chocolate milk, when consumed in moderation, has a low cariogenic potential (41).

In contrast to chocolate and other flavored milks, intake of soft drinks and sugar-containing fruit drinks, because of their high sugar content, increases caries risk (30,41). Also, the sugar and phosphoric acid in soft drinks promotes demineralization of tooth enamel (30,41,43). Recognizing that excessive intake of fruit juice may be associated with tooth decay and other health problems in children, the American Academy of Pediatrics (44) recently recommended that juice intake be limited to 4 to 6 oz/day for children 1 to 6 years and 8 to 12 oz/day for children 7 to 18 years.

- **Behavioral Disorders.** Concern that sugar intake may lead to behavioral disorders has been given as a reason to eliminate flavored milk such as chocolate milk from children's diets (25). Yet, this allegation is based on anecdotal observations or subjective reports. Under carefully designed, well controlled experimental conditions, sugar intake has not been demonstrated to cause or exacerbate behavioral disorders such as hyperactivity, learning disorders, aggression, and delinquency (22,23,27,45-49).

A well-designed study of the effect of sugar intake on behavior was conducted by Wolraich and colleagues (47). This double blind controlled trial included 25 normal preschool children ages 3 to 5 years and 23 school-aged children 6 to 10 years, all of whom were described by their parents to be sensitive to sugar. The children and their families followed a different diet for each of three consecutive 3-week periods. One diet was high in sucrose with no artificial sweeteners; one was low in sucrose with aspartame as a sweetener; and one was low in sucrose with saccharin (placebo) as a sweetener. Among the school-aged children, there were no significant differences among the three diets in any of the 39 behavioral and cognitive variables measured. For the preschool children, only four of the 31 measures differed significantly among the three diets and these differences were inconsistent (47). Thus, even when sugar intake was higher than usual, there were no effects on children's behavior or cognitive function (47). An accompanying editorial states, "it appears that any adverse effect of sugar is by no means as severe or as prevalent as uncontrolled observation and opinion would suggest. Specifically, there is no evidence that sugar alone can turn a child with normal attention into a hyperactive child. . ." (50).

In a subsequent meta-analysis of 23 blinded, controlled trials examining the effects of sugar on children's behavior or cognition, researchers found that sugar intake did not affect behavior or cognitive performance (48). Parents and others may believe that sugar intake has an adverse effect on children's behavior because large amounts of sugar tend to be consumed on holidays or Halloween when children are already exuberant (48). Based on findings to date, there is no sound scientific evidence that sugar or foods such as chocolate milk that contain added sugars contribute to behavioral disorders or interfere with children's academic performance.

- **Obesity.** The sugar content of flavored milk has been alleged to contribute to obesity. However, scientific findings fail to support the suggestion that sugar intake per se or foods containing sugar such as flavored milks, when consumed in moderation and within an appropriate caloric intake, have a unique influence on obesity (22,23,25-27). However, over-consumption of sugar, as found in children consuming excessive intakes of sugar-sweetened beverages such as soft drinks, fruit drinks, and fruit juice, can increase calorie intake and risk of obesity (44,51).

Obesity represents a positive energy (calorie) balance resulting from a long-term intake of excess calories, reduced physical activity, or a combination of these factors (25,26). This disease is multifactorial, involving genetic, hormonal, metabolic, and numerous lifestyle factors. As such, the cause of obesity cannot simply be attributed to a single dietary component. No relationship has been found between the per capita amount of sugar available in the nation's food supply and the incidence of obesity (25,52). In fact, epidemiological studies often demonstrate an inverse relationship between sugar intake and energy intake or obesity (25,52,53).

Successful weight control does not require restricting any particular food or any category of nutrients or foods (26). For individuals concerned about their weight, flavored milks such as chocolate are available in low fat and fat free versions that are reduced in calories compared to their full fat counterparts. Also, new research findings indicate that including milk and dairy foods in the diet may protect against the development of overweight and obesity (54-56).

In experimental animals fed a diet high in calcium/dairy foods, body weight and weight gain decreased (54). An analysis of data from the National Health and Nutrition Examination Survey (NHANES III) revealed an inverse association between calcium/dairy food intake and body fatness, especially in women (54). Similarly, a reevaluation of data from five studies over 12 years involving 780 women found that the highest calcium intake, mostly from dairy, was associated with lower body weight (55). In preschool children ages 2 to 5, increasing intake of dairy foods and calcium was found to be associated with lower body fat (56). However, a potentially beneficial effect of chocolate milk on body weight, when consumed within an appropriate calorie intake, has yet to be specifically examined. When obesity and excess calorie intakes are of concern, frequent consumption of high calorie nutrient void products (e.g., soft drinks) are an issue, particularly if they potentially displace nutrient dense foods such as calcium-rich dairy foods.

• **Diabetes Mellitus.** Although intake of sugar or sugar-containing foods has been proposed to contribute to or exacerbate Type 2 or non-insulin-dependent diabetes (NIDDM), there is no scientific evidence that sugar intake impairs glucose control or causes this form of diabetes (22,25,26,57-59). However, weight gain may trigger the onset of NIDDM in genetically susceptible individuals (60). Maintaining normal blood glucose levels and weight control are the primary objectives for managing NIDDM (58,59). According to nutrition guidelines issued by the American Diabetes Association, recommendations regarding sugar intake for diabetes are flexible, with intake depending on an individual's health concerns, tastes, and other lifestyle factors (58,59). Sugars added to foods do not affect blood glucose levels differently than do sugars alone (57). The total amount of carbohydrate in the diabetic diet is more important in terms of blood glucose levels than the source of carbohydrate (26).

Caffeine and Theobromine in Chocolate Milk

Caffeine and theobromine, the major methylxanthines in cacao beans, can act as mild stimulants of the central nervous system, depending on their dose and other factors (61-63). Possible adverse behavioral effects of caffeine and theobromine have been cited as a reason for restricting or eliminating chocolate milk from children's diets. Yet, there is no persuasive scientific evidence to justify this concern (61,64-67).

Chocolate milk contains a small amount of caffeine per serving compared to many other beverages (62,64, Table 2). The 2 to 7 mg of caffeine in an 8-ounce serving of chocolate milk is similar to that in one cup of decaffeinated coffee (64). Some regular soft drinks, on the other hand, contain up to 10 times more caffeine than chocolate milk (62,64). Furthermore, the amount of caffeine in a serving of chocolate milk is relatively small compared to children's average total daily caffeine intake of 38mg or 1 mg/kg body weight (62,64).

Table 2.
Caffeine in Beverages (in 8 oz servings) (64)

Beverage	Caffeine Content per Serving (range in milligrams)
Chocolate Milk	2 – 7
Cocoa beverage	3 – 22
Cola	
regular	20 – 40
caffeine free	0
Coffee	
brewed, drip method	65 – 120
instant	60 – 85
decaffeinated	2 – 4
Tea	
brewed, major U.S. brands	20 – 90
brewed, imported brands	25 – 110
instant	24 – 31
iced tea	9 – 50

Caffeine's effects on behavior depend on the dosage, an individual's usual intake, and tolerance or sensitivity to caffeine (62). At lower doses, caffeine is associated with positive subjective effects, whereas at higher intakes, subjective negative effects are reported (62). A meta-analysis of double blind, placebo-controlled studies of caffeine and behavior in children and adolescents led to the conclusion that caffeine has no adverse cognitive or behavioral effects in children (67). However, very high caffeine intakes (>3 mg/kg) in children whose usual caffeine intake is low led to negative subjective reports of nervousness, stomach aches, and nausea (67).

A double blind, placebo-controlled, crossover study of 21 prepubertal children consuming relatively moderate doses of caffeine (51 mg/day) found that the children's performance on attention tests and motor tasks improved (66). The significance of these findings for children's learning and school performance is unknown.

Chocolate milk contains about 120 mg theobromine per 8-ounce serving (68). At usual intakes of theobromine, no adverse behavioral effects in humans have been reported (69). However, at very high intakes, some negative physiological effects may occur (70). When seven adults consumed theobromine at doses of 1,000 to 2,000 mg (i.e., amounts equivalent to those in 8 to 17 servings, respectively, of chocolate milk), headaches and lethargy were reported (70). Little is known regarding the physiological effects of theobromine in healthy children (61).

Some concern has been expressed that caffeine intake negatively affects calcium balance and compromises bone health. Although a high intake of caffeine increases urinary calcium excretion, the effect is generally small and has little impact on bone health if adequate calcium is consumed (10,71). A study of 81 adolescent girls followed from age 12 to 18 found no association between caffeine intake (<25 mg/day to > 50 mg/day) and total body bone mineral gain or hip bone density (71).

Although most children's diets include some caffeine and theobromine, research findings to date provide no evidence that the levels of these methylxanthines in chocolate milk are harmful.

Other Issues Related to Flavored Milk Intake

Calcium Absorption

Chocolate milk contains a small amount of oxalic acid (0.5-0.6%), a compound occurring naturally in cocoa beans and other plants. Because oxalic acid can combine with calcium in the intestine to form calcium oxalate, which is fairly insoluble, calcium's availability from chocolate milk has been questioned. However, there is no scientific evidence that oxalic acid in chocolate milk impairs the absorption of calcium from this food (72,73). One study found that calcium absorption from chocolate milk was similar to that from unflavored milk and other calcium-containing foods (72). A reason why calcium absorption from chocolate milk is not decreased is that the cacao beans used in the production of chocolate milk are always fermented and processed, which reduces oxalate levels (63).

Lactose Intolerance

People with lactose maldigestion may tolerate chocolate milk more easily than unflavored milk (74,75). Lactose maldigestion is the limited ability to digest lactose, the main carbohydrate in milk, due to insufficient levels of the intestinal enzyme, lactase. Most individuals with lactose maldigestion can comfortably drink two cups of any type of milk a day when consumed in small servings with foods at separate meals (e.g., breakfast and dinner) (76,77). Because most individuals drink flavored milk such as chocolate milk with meals (2), this beverage is likely to be well tolerated by lactose maldigesters. Also, the cocoa in chocolate milk may slow gastric emptying (74,75). In one study of 16 individuals with lactose maldigestion who consumed chocolate and other milks, chocolate milk significantly reduced breath hydrogen production compared to fat-free unflavored milk (75).

Preference For And Attitudes Related to Flavored Milk

Flavored milks such as chocolate milk are well accepted, especially by children and adolescents, but also by parents, school food service directors, and pediatricians (2,5,19,20, 78-80). When 600 children ages 8 through 13 were asked about their attitudes toward milk and their milk-drinking habits, 78% agreed that they like the taste of chocolate milk (5). Thirty-nine percent said that they would drink more milk if it were chocolate and 45% agreed that they would drink more milk at school if more flavors were offered (5). Another survey found that approximately one-third of children aged 9 to 11 would drink more milk if it were chocolate (2).

Children are more likely to drink chocolate milk at school than at home (5). In a small study of about 60 sixth grade students in an elementary school in New York City, students rated 1% chocolate flavored milk more acceptable than either unflavored 1% or unflavored whole milk (20). The children consumed a greater quantity of the 1% chocolate flavored milk than either of the unflavored milks. Likewise, milk's flavor was found to be an important factor influencing children's milk drinking in a study of elementary school students aged 6 to 11 years in northern Texas (78). The majority of children chose chocolate milk at school. When asked about what advice they would give a new student at school, the children's typical response included "get chocolate milk" (78). This study found that milk flavor was the most important environmental factor influencing milk drinking (78).

Parents are also supportive of offering flavored milk to children in schools (79). When 200 parents of children ages 8 to 13 were interviewed, the majority of parents (85%) agreed that chocolate milk should be offered to students either daily (65%) or at least a few times a week (20%) (79). Eighty-one percent of parents considered chocolate milk to be a healthy treat (79).

School food service directors support offering students flavored milk (19). When 206 school food service directors in elementary and secondary schools in the southwest region of the U.S. were interviewed about the types of beverages offered in school food service programs, approximately 78% supported serving chocolate flavored milk (19). Main reasons given by the directors for serving chocolate milk were students' preference for chocolate milk (81.8%), their increased participation in school meal programs (41.7%), and higher calcium intakes (33.3%) (19).

Pediatricians agree that chocolate milk is a nutritious beverage for children (80). According to a recent telephone survey of 300 pediatricians, the majority (87%) agreed that chocolate milk is a nutritious beverage option for children (80). Nearly 60% of those surveyed agreed that low fat and fat free chocolate milk is "the best beverage source of calcium," placing it above both calcium fortified orange juice and soymilk (80). This survey also revealed that 100% of pediatricians agreed that calcium is important for children's growth and development (80). Ninety-three percent of pediatricians surveyed said that children are not consuming enough calcium in their diets, with nearly 35% of all pediatricians being "very concerned" about children's low dietary calcium intake (80).

Summary and Conclusion

Flavored milks not only are well liked, especially by children and adolescents, but parents, school food service directors, and health professionals support intake of this beverage. The availability of flavored milks increases overall milk and nutrient intake. Health and behavior concerns related to components in flavored milks such as small amounts of sugar, caffeine, and oxalate are unfounded. This review of the scientific literature addressing various behavioral and health issues related to flavored milks indicates the following:

- Flavored milks are as nutritious as unflavored milks. Both types of milks are nutrient dense foods containing a high proportion of essential nutrients in relation to their energy content. Chocolate milk, for example, provides the same essential nutrients as white milk, including calcium, protein, vitamin D, vitamin A, vitamin B₁₂, potassium, phosphorus, riboflavin, and niacin. Like unflavored milks, all versions of flavored milks provide 300mg calcium per serving or about one-third to one-fourth of children's daily calcium recommendation.
- The main difference between flavored milk such as chocolate and unflavored milk is the 2 to 4 teaspoons more sugar (sucrose or high fructose corn syrup) and about 60 more calories per serving in chocolate milks.
- Intake of sugar may contribute to dental caries, but it is unlikely that flavored milks cause this disease. Flavored milks, being liquid, do not readily adhere to tooth surfaces. Also, components in flavored milks may protect against dental caries. According to the American Academy of Pediatric Dentistry, because chocolate milk is a beverage it is less likely to cause cavities than sticky foods. Also, the calcium, phosphorus, and cocoa in chocolate milk may protect teeth from decay.
- The minute amount of caffeine in chocolate milk, which is similar to the amount in decaffeinated coffee, is generally considered too small to affect most children's behavior or health. Similarly, there is no evidence that theobromine in chocolate milk affects children.
- Although cocoa contains oxalate which binds calcium, calcium is absorbed equally well from chocolate and unflavored milks.
- For individuals with lactose maldigestion, flavored milks such as chocolate may be better tolerated than unflavored milks.
- Intake of chocolate milk does not spoil children's appetites nor displace intake of other foods at the same meal.
- Allowing the option of moderate amounts of flavored milks such as chocolate milk in a nutritionally balanced diet is compatible with nutrition education efforts and dietary guidelines. Successful nutrition education teaches people how to choose appropriate amounts of a wide variety of foods. The U.S. Dietary Guidelines for Americans recognizes that some foods with added sugars such as chocolate milk are also high in vitamins and minerals. The guidelines recommend that all individuals two years of age and over "choose beverages and foods to moderate your intake of sugars."
- Because of flavored milks' important contribution to children's nutrient intake, nutrition education messages targeted to children and their parents should encourage intake of low or nonfat flavored milks. Also, health professionals should support policies that allow flavored milks to be offered as a beverage option in school nutrition programs.

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THINK
YOUR

DRINK!

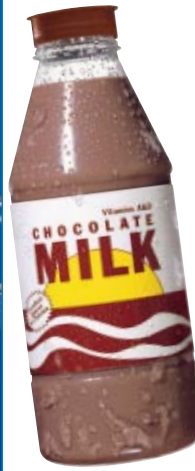
When it comes
to NUTRITION,
not all drinks are
created equal!



MILK
LOWFAT 1%
Calories 100

	% Daily Value
Total Fat	4%
Total Carbohydrates	4%
Protein	16%
Vitamin A	10%
Vitamin C	2%
Vitamin D	25%
Calcium	30%

Serving Size: 8 ounces



CHOCOLATE MILK
LOWFAT 1%
Calories 160

	% Daily Value
Total Fat	4%
Total Carbohydrates (includes 4 tsp added sugar)	10%
Protein	16%
Vitamin A	10%
Vitamin C	2%
Vitamin D	25%
Calcium	30%

Serving Size: 8 ounces



COLA
Calories 150

	% Daily Value
Total Fat	0%
Total Carbohydrates (includes 9 tsp added sugar)	14%
Protein	0%
Vitamin A	0%
Vitamin C	0%
Vitamin D	0%
Calcium	0%

Serving Size: 12 ounces



**FRUIT
PUNCH**
Calories 130

	% Daily Value
Total Fat	0%
Total Carbohydrates (includes 6¾ tsp added sugar)	11%
Protein	0%
Vitamin A	0%
Vitamin C	0%
Vitamin D	0%
Calcium	0%

Serving Size: 8½ ounces



**100%
ORANGE JUICE**
Calories 110

	% Daily Value
Total Fat	0%
Total Carbohydrates	8%
Protein	0%
Vitamin A	2%
Vitamin C	150%
Vitamin D	0%
Calcium	2%

Serving Size: 8 ounces



**DIET
COLA**
Calories 0

	% Daily Value
Total Fat	0%
Total Carbohydrates	0%
Protein	0%
Vitamin A	0%
Vitamin C	0%
Vitamin D	0%
Calcium	0%

Serving Size: 12 ounces