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Beyond Taste and Easy Access: Physical, Cognitive, Interpersonal, and Emotional Reasons for Sugary Drink Consumption among Children and Adolescents

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Abstract

Consumption of sugary drinks is associated with the development of obesity and cardiometabolic diseases among children and adolescents. In addition to high added sugar content, many sugary drinks also contain caffeine. However, whether the combination of sugar and caffeine uniquely influences children's sugary drink intake is presently unknown. This study aimed to evaluate contextual factors surrounding children's sugary drink consumption and investigate reasons for sugary drink intake among children and adolescents, with a specific focus on caffeinated sodas and sweet tea. We also evaluated how sugary drink consumption makes children feel and how they anticipate that they would respond if sugary drinks were restricted. Focus group discussions (n=9, 2–8 participants per group) were conducted with 37 predominantly African-American children and adolescents, ages 8–14 years, who consumed 1 caffeine-containing sugary drink(s) daily, based on parental report. Focus groups were audio-recorded and transcribed verbatim. Transcripts were

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Author Contributions

ACS, AJV, KDE, WHD, and JS designed the study. ACS, SH, DR, and ZO transcribed, coded, and analyzed the data. ACS, SH, DR, and ZO wrote the first draft of the manuscript. All authors were involved in editing and revising the manuscript and approved the submission of this article to *Appetite*.

Competing Interests Statement

None of the authors have any competing interests to declare.

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independently coded by two coders, after which emergent themes were identified. Reported reasons for sugary drink consumption encompassed five themes: 1) perceived need (e.g., satisfy cravings, quench thirst); 2) physical and cognitive benefits (e.g., provide energy, improve attention); 3) emotional and interpersonal benefits (e.g., relieve anger, facilitate socializing); 4) sensory properties (e.g., taste, carbonation); and, 5) external cues (e.g., family/peer modeling, availability). Negative consequences resulting from excess intake were also reported, including gastrointestinal symptoms, headaches, fatigue, hyperactivity, and chronic disease. Perceived physical, cognitive, emotional, and interpersonal benefits encourage sugary drink consumption and exacerbate well-described challenges of sugary drink reduction, including their palatability, accessibility, and affordability. Findings also suggest that incorporation of strategies to enhance physical, cognitive, and emotional health may hold promise in reducing sugary drink consumption among children and adolescents.

Keywords

sugar; caffeine; soda; soft drinks; obesity; pediatric

1. Introduction

Excess intake of sugary drinks, such as soda and sweet tea, is associated with excess weight gain (Berkey, Rockett, Field, Gillman, & Colditz, 2004; Malik, Pan, Willett, & Hu, 2013), dental caries (Chi & Scott, 2019), dyslipidemia (Vos et al., 2017), and fatty liver (Davis et al., 2010) among children and adolescents. Sugary drinks are the greatest contributor to added sugar intake in the United States (U.S.) and many countries worldwide (Popkin & Hawkes, 2016). Approximately two-thirds of youth in the U.S. consume one or more sugary drinks daily, with the highest consumption reported among adolescents (Rosinger, Herrick, Gahche, & Park, 2017).

Lowering sugary drink consumption is a key component of lifestyle behavior change in the prevention and management of obesity and related cardiometabolic diseases (Fidler Mis et al., 2017; Yoshida & Simoes, 2018). However, public health efforts to reduce sugary drink intake have been met with limited success (Kirkpatrick, Raffoul, Maynard, Lee, & Stapleton, 2018). Reducing sugary drink intake may be particularly challenging for children and adolescents from minority and low-income backgrounds, because they are more likely to be high sugary drink consumers (Mendez, Miles, Poti, Sotres-Alvarez, & Popkin, 2019) and often experience difficulty sustaining lifestyle modifications, due to a myriad of psychosocial factors (e.g., low self-efficacy, limited nutrition and health knowledge), systemic inequities (e.g., disparities in sugary drink advertising (Powell, Wada, Khan, & Emery, 2017)), and environmental considerations (e.g., limited access to grocery stores, high density of fast food venues (Cooksey-Stowers, 2017)).

In addition to contributing to added sugar intake, sugary drinks are also the predominant source of caffeine among youth (Ahluwalia & Herrick, 2015). Repeated caffeine intake causes dependence in adults (Juliano & Griffiths, 2004), and may further drive sugary drink consumption. However, the majority of research on sugary drink consumption has focused

on their sugar content with little attention to caffeine, except in the case of energy drinks and coffee beverages (Owens, Mindell, & Baylor, 2014).

Caffeine doses as low as 100 mg per day induce withdrawal symptoms (e.g., headache, jitteriness, poor concentration), indicative of dependence, in adults (Striley, Griffiths, & Cottler, 2011). It is likely that chronic intake of lower doses of caffeine, such as 35–55 mg in a 12-ounce can of soda (e.g., Pepsi™, Coca-Cola™, Mountain Dew™) or a 16–20 ounce bottle of sweet tea (e.g., Snapple™, Arizona™) could promote dependence among children (Temple, 2009). Furthermore, the combination of caffeine and sugar may uniquely encourage continued soft drink intake, and may predispose children and adolescents to choose sugary drinks with caffeine as opposed to caffeine-free alternatives. The purpose of this study was to evaluate contextual factors surrounding children’s sugary drink consumption such as when, where, and how sugary drinks were obtained, and to comprehensively investigate reasons for sugary drink consumption among school-aged children and adolescents, with a specific focus on sugary drinks with caffeine, namely soda (e.g., colas, Mountain Dew™) and sweet tea (e.g., Arizona™, Nestea™). We also assessed how children felt when consuming these beverages and how they would hypothetically respond if sugary drinks were restricted.

2. Methods

2.1 Participants and recruitment

Children and adolescents 8–14 years-old were recruited between March and November 2019, primarily from community organizations primarily serving low-income, minority populations throughout the greater Washington, District of Columbia (D.C.) metropolitan area. Recruitment ended when data saturation was reached, which was dictated by repeated instances of the same codes, with no new codes emerging during the coding process (Saunders et al., 2018).

2.2 Inclusion and exclusion criteria

Inclusion criteria consisted of parents reporting that their child: 1) was between 8–14 years; 2) consumed 12 ounces of caffeinated, sugary, non-diet, drinks (e.g., Coca-Cola™, Pepsi™, Mountain Dew™, Arizona Iced Tea™) per day; and 3) spoke English fluently. Exclusion criteria were parents reporting that their child consumed regular or caffeine-containing coffee, hot tea, or energy drinks (e.g., Red Bull™, Monster™) 1 time per week or that their child had been diagnosed with diabetes. Energy drink consumption was a criterion for exclusion because energy drinks are marketed specifically to boost energy (Committee on, the Council on Sports, & Fitness, 2011) and their use likely reflects a different behavior compared to consumption of sugary drinks such as colas and sweet teas. Eligibility was assessed by a trained study team member via e-mail or phone.

2.3 Institutional Approval and Informed Consent and Assent

The study protocol was reviewed and approved by the Institutional Review Board at Children’s National Hospital (protocol #11014). The participants’ parent(s) or guardian(s)

provided written informed consent, and the participants provided written assent, prior to beginning the study procedures.

2.4 Study Procedures

Focus group discussions (30–45 minutes in duration) took place on-site at community organizations (e.g., community centers, schools) and were scheduled after school (n=8 groups) or during the weekend (n=1 group) to accommodate participant schedules and minimize participant burden. Prior to beginning the discussion, parents were asked to complete a brief demographic questionnaire, while participants were asked to complete a brief survey designed to evaluate the children's consumption of specific beverages of interest (sugary drinks with caffeine and sweet tea) and to obtain quantitative data on contextual factors surrounding children's sugary drink intake. Survey questions included which sugary drinks they liked and disliked and why, how they obtained them, and when and where they consumed them. Multiple responses could be selected for each question. Participants (n=4) in one focus group were unable to complete the survey due to scheduling constraints.

Focus group discussions were conducted in English by a trained moderator (ACS). Trained research assistants (SH and others) provided logistical support and took detailed notes throughout the discussions. The semi-structured focus group discussion guide (Supplemental File) was developed collaboratively by three study team members (ACS, AJV, JS) and focused on reasons for sugary drink consumption, including what children like about sugary drinks, why they choose sugary drinks over other beverages, how they obtain them, and how they feel when they drink them. Participants were also asked how they would hypothetically feel if they were unable to consume sugary drinks for two weeks. Probing and nonverbal communication were used to encourage participation and facilitate response clarification and elaboration. Participants received a gift card as compensation for their participation. All focus group discussions were audio-recorded and transcribed verbatim (ZO and others).

2.5 Data analysis

Descriptive statistics, including means and frequencies, were used to summarize participant characteristics and survey responses. Two coders (SH and DR) independently coded a subset of the transcripts using the NVivo Pro software package (version 12; QSR International, Inc.; Burlington, MA, USA). The two coders then created a shared codebook and added new codes, as they emerged, in order to develop the final codebook. Transcripts were reviewed (ACS, SH, DR) to ensure that coding of all transcripts was in accordance with the final codebook. Any discrepancies between coders were discussed until consensus was reached or the disagreement was resolved by a third team member (ACS), as necessary. The two coders (SH and DR) independently identified preliminary emergent themes and subthemes, which were then discussed with a third team member (ACS). Themes and subthemes were further organized and refined, and quotations representative of each theme and subtheme were selected.

3. Results

3.1 Participant characteristics

Thirty-seven children and adolescents participated in one of nine focus group discussions, each with two to eight participants. Demographic characteristics of the study participants are summarized in Table 1. Participants were, on average, 10.5 years of age and were predominantly Black/African American (83%) or Hispanic (11%). Due to an inability to collect demographic information from participants at one partner community organization, race/ethnicity for seven participants was not parent-reported and was inferred based on the organization's mission and demographic served.

3.2 Pre-focus group survey

Thirty-three participants completed a brief survey prior to each focus group (Table 2). Participants most frequently reported that orange soda (70%), sweet tea (67%), cola (61%), and Mountain Dew™ (58%) were among their favorite sugary drinks. The primary reasons for liking these drinks included “they taste good” (79%) and “they give me energy” (67%). Although the majority (94%) of participants reported liking carbonated sugary drinks, nearly half indicated an aversion to bubbles (45%) and nearly one third (30%) reported stomachaches resulting from sugary drink consumption.

Consumption of sugary drinks at dinner (58%), on special occasions (58%), after school (54%), at snack time (45%), at lunchtime (43%), and with friends (36%) were frequently reported, and a small subset also reported consuming sugary drinks with breakfast (6%). Participants commonly acquired sugary drinks from their parents (82%), and all but one child reported drinking sugary drinks at home (98%). Sugary drink consumption while in the car (61%), at a restaurant (48%), at a friend's house (45%), and at school (30%) were also frequently reported.

Of the 33 participants who completed the survey, 91% (n=30) reported liking water, primarily due to its perceived health, energy, and thirst-quenching benefits. All three participants who reported that they did not like water indicated that water did not have a flavor (100%). Just over half of the participants (55%) reported liking plain milk, most often because it “tastes good” (40%). Participants who reported disliking milk (n=15) cited taste and gastrointestinal consequences as key reasons (67% and 22%, respectively).

3.3 Focus group discussions

Five key themes related to children's reported reasons for sugary drink consumption emerged from the focus group discussions (Table 3). Another theme was that children reported negative consequences resulting from sugary drink consumption, particularly with respect to consuming “too much” (Table 4). A minor emergent theme was that children consumed sugary drinks even when they were difficult to obtain (Table 5).

3.3.1 Children and adolescents report a variety of reasons for drinking sugary drinks—As shown in Table 3, five key themes emerged as reasons for sugary drink consumption. A major theme was that children and adolescents perceived a need for sugary

drinks. Participants reported that drinking sugary drinks was an essential part of their daily life. For example, participants described a perceived need for sugary drinks to feel normal, satisfy a craving, and/or quench their thirst.

Children and adolescents reported that energy from sugary drinks facilitated their involvement in activities and enhanced their performance (e.g., ran faster, got smarter). They also described feeling more awake and better able to concentrate as a result of sugary drink consumption. The feeling of a “sugar rush” was also widely regarded as a key driver of intake. In addition, participants reported emotional and interpersonal benefits of consuming sugary drinks. For example, sugary drink consumption reduced anger and produced a feeling of happiness, and some children and adolescents mentioned that sugary drinks facilitated engagement in social situations.

Preferences for the flavor, taste, carbonation, and refreshing qualities of sugary drinks were also commonly mentioned. Children and adolescents reported enjoying the sweetness and preferring sugary drinks over alternatives, such as water. Views regarding carbonation were mixed; many participants reported enjoyment of bubbles, specifically with regard to burping, while others indicated that they did not like the bubbles. Sugary drink consumption was also commonly reported as a means of cooling down after physical activity or in the context of warm weather, as well as a way to quench thirst.

External cues were also recounted as key drivers of sugary drink consumption. Children and adolescents reported external pressure and a stronger desire to consume sugary drinks when they observed others drinking them. The availability of sugary drinks in the home, as well as the provision of these drinks by family members and adults at school, also encouraged consumption. A subset of participants reported drinking sugary drinks because there were not better options available.

3.3.2 Children and adolescents perceive negative consequences to drinking sugary drinks—Negative health consequences resulting from sugary drink consumption (Table 4) were described in response to the question about how drinking sugary drinks made the children feel, particularly when children recounted situations in which they had consumed “too much”. Adverse effects of sugary drink intake were reported, both in relation to children’s own consumption and excess intake among family members. Children reported unpleasant gastrointestinal consequences (e.g., stomachaches, cramps) resulting from excess intake of sugary drinks, as well as headaches and/or fatigue. Some children also mentioned that sugary drink consumption increased the risk of chronic illnesses such as obesity, diabetes, and/or kidney problems. Although hyperactivity was perceived as favorable in many cases, children also described hyperactivity, specifically feeling “crazy,” as a negative consequence of sugary drink intake.

3.3.3 Children and adolescents do whatever is needed to obtain sugary drinks—A minor emergent theme was that children reported making considerable efforts to obtain sugary drinks. Children described hiding and/or sneaking sugary drinks when access was restricted. A subset of children also mentioned disguising the containers from which they drank sugary drinks, or concocting homemade, sugar-containing, alternatives.

4. Discussion

Our findings demonstrate that children and adolescents consume sugary drinks for physical, cognitive, emotional, and interpersonal reasons, in addition to previously described factors, such as their palatability and accessibility (Bogart et al., 2013; Couch, Glanz, Zhou, Sallis, & Saelens, 2014). Notably, children and adolescents described sugary drink intake as an inverted J-shaped phenomenon, where consuming “too much” resulted in negative consequences.

Consistent with previous reports (Bogart et al., 2013; Eck et al., 2018; Haughton et al., 2018; Lopez et al., 2012; Santiago-Torres et al., 2016; Sylvetsky et al., 2020; Zahid, Davey, & Reicks, 2017), the vast majority of children and adolescents reported that they obtained sugary drinks from their parents and consumed them while at home. This observation emphasizes the need to target family and home environments to address sugary drink consumption (Brown, Halvorson, Cohen, Lazorick, & Skelton, 2015; Fulkerson et al., 2018). Furthermore, nearly half of the participants reported consuming sugary drinks while at school. While initiatives to remove sugary drinks from schools have been widely implemented (Welsh, Lundeen, & Stein, 2013; Wescott, Fitzpatrick, & Phillips, 2012), four children reported obtaining sugary drinks from teachers or other adults at school and other reported purchasing sugary drinks on the way to or from school. In both the survey and the focus group discussions, children frequently reported purchasing sugary drinks from corner stores, convenience stores, and local vendors (e.g., “the candy lady”). These beverage retail venues are disproportionately located in close proximity to schools serving low-income and/or minority students (Elbel et al., 2019; Tester, Yen, Pallis, & Laraia, 2011).

A promising finding was that nearly all the children and adolescents reported that they liked drinking water and, in some cases, chose sugary drinks primarily because water was not available. This choice may be specifically due to the unavailability of bottled water, because negative perceptions of tap water and water fountains are commonly reported, particularly among minority youth (Onufrak, Park, Sharkey, Merlo, et al., 2014). African-American and Hispanic youth are more likely to perceive risks of tap water compared to non-Hispanic white youth, and a negative perception of tap water has been associated with higher sugary drink intake (Onufrak, Park, Sharkey, Merlo, et al., 2014). Prior interventions that have educated families about water safety have shown promise in increasing water intake (Kenney et al., 2015), underscoring the need to increase the availability and acceptability of tap water as a means of reducing sugary drink consumption, particularly in non-school settings (Onufrak, Park, Sharkey, & Sherry, 2014; Patel & Hampton, 2011).

Similar to prior studies (Bogart et al., 2013; Eck et al., 2018; Lopez et al., 2012; Zahid et al., 2017), participants reported that the taste of sugary drinks and factors related to the home and built environments were key reasons for consumption. However, in the present analyses, which focused specifically on consumers of caffeinated soda (e.g., colas, Mountain Dew™) and sweet tea (e.g., Arizona™, Nestea™), children and adolescents described a range of physical, cognitive, emotional, and interpersonal benefits resulting from sugary drink intake, as well as a perceived need (e.g., satisfy cravings, quench thirst) to consume sugary drinks.

These findings highlight the extent to which sugary drink consumption reflects a complex behavior with hedonic, physiological, psychological, and sociocultural underpinnings.

Prior research has demonstrated that adolescents and young adults consume caffeinated beverages to stay awake (Ludden, O'Brien, & Pasch, 2017), improve concentration (Mahoney et al., 2019), and augment sports performance (Committee on et al., 2011). Past work has also shown that adolescents consume caffeinated beverages as a means of socializing (Costa, Hayley, & Miller, 2014; Visram, Crossley, Cheetham, & Lake, 2017). These previous studies have focused primarily on energy drinks, although consumption of soda is far more prevalent among U.S. youth (Drewnowski & Rehm, 2016). The majority of these studies have also enrolled college students or older adolescents (Bunting, Baggett, & Grigor, 2013; McCrory et al., 2017), with little available information in school-aged children or younger adolescents.

Interestingly, participants described sugary drink consumption as embedded in their daily routines. Sugary drink consumption was described as fun and social, which may stem from child-targeted sugary drink advertisements (Harris & Bargh, 2009), that promote fun, feeling happy, and “being cool” (Folta, Goldberg, Economos, Bell, & Meltzer, 2006). A particularly novel finding was that children reported that sugary drink intake fostered a feeling of normalcy, provided emotional benefits, reduced negative affect or sadness, and relieved the anger and irritability that arose in the absence of sugary drinks. Reported reliance on sugary drinks for emotional well-being may reflect a withdrawal-like syndrome. Affective withdrawal symptoms have been reported for other substances, such as caffeine (Juliano & Griffiths, 2004), and were recently documented in the context of processed-food withdrawal among children (Parnarouskis, Schulte, Lumeng, & Gearhardt, 2019). In contrast to our parent-reported findings (Sylvetsky et al., 2020), physical withdrawal-like symptoms, such as headaches or stomachaches in the absence of sugary drinks, were not mentioned by children or adolescents.

Development of withdrawal-like symptoms from sugary drink restriction, whether physical, cognitive, or affective, requires further investigation and may represent an overlooked barrier to implementing and sustaining sugary drink behavior change (Falbe, Thompson, Patel, & Madsen, 2019). These symptoms may be particularly critical to address within the first several days of sugary drink reduction, similar to the well-documented time course of withdrawal symptom onset for addictive substances (Koob & Le Moal, 2001). Participants often described only being able to avoid sugary drinks for one or two days before reverting to their usual consumption, suggesting that the timeframe coinciding with peak withdrawal may be a critical period for intervention.

4.1 Strengths and Limitations

A key strength of our study is enrollment of predominantly African American children and adolescents from low-income backgrounds and underserved communities throughout Washington, D.C., which lays the groundwork for designing interventions tailored to this population. However, this sample may also be viewed as a limitation because the results may not be generalizable to the broader population of youth who frequently consume sugary drinks. Another important consideration is that some of the focus group sizes were small,

which reduced interaction between participants and may have precluded discussion of additional ideas. This may also be viewed as a strength, however, because the small size of the groups may have enhanced children's comfort with sharing their ideas and experiences. Some participants, particularly younger children, were also shy and despite continued probing and nonverbal communication by the moderator to elicit more information, were at times hesitant to clarify or elaborate on their responses. Although we specifically recruited individuals who reported daily consumption of sugary drinks with caffeine, we were unable to differentiate between drivers of consumption specific to sugar, caffeine, or both ingredients in combination.

5. Conclusions and Implications

Our findings demonstrate that perceived physical, cognitive, emotional, and interpersonal benefits of sugary drink intake further reinforce consumption and exacerbate well-described challenges of sugary drink reduction, including their palatability, accessibility, and affordability. These results highlight the need to design multi-component interventions targeting the individual, interpersonal, community, and societal levels. Strategies for improving physical, cognitive, and mental health may also be needed as part of comprehensive efforts at the intrapersonal level to initiate and sustain reductions of sugary drink intake among children and adolescents.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Demographic characteristics of the study participants

N	37
Age (mean \pm SD)	10.5 \pm 1.9
Sex (n, (%))	
Male	22 (59%)
Female	15 (41%)
Race/Ethnicity^{1, 2} (n, %)	
Black/African American	30 (81%)
Hispanic	4 (11%)
Asian	1 (3%)
Mixed race	1 (3%)
Missing race/ethnicity	1 (3%)

¹Race/ethnicity was not parent-reported for 7 participants²Percentages do not sum to 100% due to rounding

Table 2.

Preferences and contextual factors surrounding children's sugary drink consumption (n=33¹)

What are your favorite sugary drinks?	N	Percent
Orange Soda ³	23	70%
Sweet Tea (e.g., Snapple™, Arizona™, Nestea™)	22	67%
Cola (e.g., Coke™ or Pepsi™)	20	61%
Mountain Dew™	19	58%
Root Beer	10	30%
Dr. Pepper™	9	27%
Cream Soda	8	24%
What do you like about sugary drinks?		
They taste good	26	79%
They give me energy	22	67%
They take away my thirst	15	45%
They help me feel awake	10	30%
They are fun to drink with my friends	9	27%
They make me happy	9	27%
They help me focus	7	21%
Is there anything you do not like about these drinks?		
I don't like the bubbles	15	45%
They give me a stomachache	10	30%
They make me feel jittery or shaky	5	15%
They give me a headache	2	6%
When do you normally drink these drinks?		
With dinner	19	58%
On special occasions (e.g., birthday parties, holidays)	19	58%
After school	18	55%
At snack time in school	15	45%
At lunchtime	14	42%
When I am with my friends	12	36%
At summer camp	7	21%
With breakfast	2	6%
How do you normally get these drinks?		
From my parents	27	82%
I purchase them at the grocery store	23	70%

What are your favorite sugary drinks?	N	Percent
I order them at a restaurant	19	58%
I purchase them at the gas station/convenience store	15	45%
From my friends	13	39%
I purchase them at school	3	9%
Where do you normally drink these drinks?		
At home	32	97%
In the car	20	61%
At a restaurant	16	48%
At a friend's house	15	45%
At school	10	30%
At camp	6	18%
At the community center	6	18%
At church or other religious events	5	15%
Do you like to drink water?		
Yes	30	91%
No	3	9%
If yes, why do you like to drink water?⁴		
Is healthy/good for you	8	27%
Energizes	7	23%
Refreshes/quenches thirst	6	20%
Missing reason	3	10%
Tastes good or different from other drinks	2	7%
Is a replacement when there is no soda	2	7%
Balances out sweets	1	3%
Keeps face clean (i.e., clear skin)	1	3%
If no, why do you not like to drink water?⁴		
No flavor	3	100%
Do you like to drink plain milk?		
No	18	55%
Yes	15	45%
If yes, why do you like to drink plain milk?⁴		
Tastes good	6	40%
Is healthy	2	13%

What are your favorite sugary drinks?	N	Percent
Makes me strong	2	13%
Can have sugar or chocolate added to it	2	13%
Missing reason	2	13%
Has sugar in it	1	7%
If no, why do you not like to drink plain milk?⁴		
Does not taste good	12	67%
Adverse gastrointestinal consequences	4	22%
Missing reason	2	11%

¹ Survey not completed in FG6 (n=4) due to scheduling/timing constraints.

² Multiple responses selected for each question.

³ Only some brands of orange soda (e.g., Sunkist™) are caffeinated. If orange soda was only sugary drink reported, brand was queried for determination of eligibility.

⁴ Answers categorized based on open-ended participant responses.

Table 3.

Children and adolescents report a variety of reasons for sugary drink consumption

Theme Subtheme	Select representative quotations (FG, ID) ^f
Perceived physical and cognitive benefits	
Provides energy	"It makes me feel like I got energy in my body and want to do a lot of stuff." (FG3, ID6) "I like the caffeine and how it tastes because it gives me more like energy and stuff. I can do more things." (FG1, ID4)
Reduces sleepiness	"When you wake up you don't have a lot of energy, so like, [you] get yourself ready and like drink it [a sugary drink] and get ready for the day; have energy." (FG4, ID4) "[Sugary drinks help me] like wake up more from being sleepy, so it's like a kids' coffee to me." (FG1, ID1)
Makes kids "hype"	"You decide that you and your friends want to go to the store and come back. [When you] get to school and like start drinking you'll be hype and crazy." (FG5, ID2) "[I like sugary drinks because], well, it's like so sugary and it gets me hype. It [sugary drinks] makes me feel like I'm doing something very, very, very fun." (FG6, ID1)
Enhances performance	"I drink soda because it makes me run a little bit faster." (FG6, ID2) "I drink sodas, so it can make me smarter. I think." (FG6, ID1)
Improves attention	"[If I couldn't have any sugary drinks for two weeks], I wouldn't focus." (FG5, ID4) "If I'm thirsty and I look in the refrigerator and there's no soda, tea, or something like that; I'll get mad. Like if someone's trying to talk to me, I don't pay attention." (FG5, ID1)
Perceived need	
Fulfills a need	"...I feel like I need it [sugary drinks]. I feel like it's something I really love and that I can't take a day without it." (FG1, ID2) "...I can't live without soda." (FG2, ID 4)
Fosters a feeling of normalcy	"[If I couldn't have sugary drinks] I would feel unbalanced; I wouldn't feel like myself. I would not feel [as] balanced as I did before." (FG1, ID1) "I would feel weird [without sugary drinks]. I wouldn't feel like my normal self." (FG1, ID2)
Satisfies cravings	"[Drinking sugary drinks] makes me feel like I want another cup of it [a sugary drink]." (FG6, ID3) "I just have an urge to drink it [sugary drinks]." (FG7, ID 1)
Quenches thirst	"I drink it because it helps me quench my thirst." (FG5, ID3)
Part of routines	"[While] sitting around all day watching TV or just chilling...I end up getting thirsty and I just go get me a soda." (FG3, ID 2) "Get one before class, and then one after class, one before class, then I get one after class, then one before class again, and then before another class, I don't get one for one period, then lunch comes, and I get another one..." (FG4, ID5) "We get a donut or a bag of chips. If we get a donut, we can get a juice with that and we get a soda if we get chips." (FG2, ID1)
Perceived emotional and interpersonal benefits	

Theme Subtheme	Select representative quotations (FG, ID) ¹
Relieves anger	<p>"It takes away my angry issues." (FG2, ID5)</p> <p>"When I'm angry at my brother [for taking] my stuff, I go to my room and drink Pepsi." (FG2, ID1)</p>
Reduces negative affect	<p>"I come home from school [and] I be sad. Then I get something to drink and I be hype. Then next time I go out of the house for school I get sad again." (FG4, ID1)</p> <p>"I be sad because sometimes I'll still be like down and won't have no soda to bring me up." (FG6, ID3)</p>
Induces happiness	<p>"When you're like feeling down or sad, you have a soda and it just make you happy." (FG3, ID3)</p> <p>"It [drinking sugary drinks] makes me feel happy." (FG2, ID3)</p>
Facilitates socializing	<p>"I know I don't talk a lot, so when I drink soda, I see that I talk more." (FG1, ID1)</p> <p>"[While drinking sugary drinks] we're enjoying it, laughing, talking about stuff, talking about what happened yesterday, if our football team won..." (FG4, ID5)</p>
Enjoy sensory properties	
Has different flavors	<p>"We drink sugar because it has more flavor in it than water." (FG2, ID2)</p> <p>"The flavors can make you have fun with the drink." (FG1, ID1)</p>
Makes kids burp	<p>"I just like drink it like this [demonstrates act of drinking] and I swallow it... and then by the time I finish the rest of the bottle, I burp really loud." (FG7, ID1)</p> <p>"I like messing with my brother when I burp [after drinking Sugary drinks]." (FG1, ID1)</p>
Tastes good	<p>"When I first tried it, it was so sugary and I liked it so much." (FG6, ID1)</p> <p>"I ain't had nothing like it [sugary drinks] before." (FG4, ID1)</p>
Tastes better than water	<p>"Yeah, because it [water] don't have no flavor to it, and it doesn't give me more energy to do stuff [like sugary drinks do]." (FG1, ID4)</p> <p>"Water's healthy, [but] soda's sweet and tasty and refreshing." (FG9, ID1)</p>
Is refreshing	<p>"[When I drink sugary drinks] I like cool down from the heat and I also get active." (FG2, ID2)</p> <p>"When it's hot I drink so many Pepsi's™ until I [start] getting cold." (FG2, ID5)</p>
Perceived external cues of influence	
Consumed when modeled by others	<p>"It [not drinking sugary drinks] didn't work out for me...because you know, like, once you see your parents eating something..." (FG4, ID4)</p> <p>"[I drink a sugary drink] because my special teacher, he be drinking." (FG4, ID5)</p>
Chosen when other options are unavailable	<p>"When you have dinner and you don't have nothing good [to drink], you drink soda." (FG5, ID2)</p> <p>"If somebody don't got nothing to drink in their house but soda, [they'll drink sugary drinks]." (FG3, ID5)</p>
Chosen when water is not available	<p>"[When] I get thirsty [and] I don't have no water in the house, [I] instead get soda, because we don't, because we ran out of water in the house." (FG8, ID2)</p> <p>"Yesterday when I went to the party, there [was] no water, so I take soda." (FG8, ID1)</p>
Encouraged by environmental cues	<p>"When you go to the store, [if] someone has the two-liter bottle they'll tempt me to get it." (FG5, ID1)</p> <p>"At a pizza party or something they bring you soda." (FG3, ID2)</p>

Theme Subtheme	Select representative quotations (FG, ID) ^f
Provided by family members	<p>“... When I go to my grandparents’ house, I just have some tea juice [sweet tea], and when I go [to] my mom’s house she always has Pepsi™ and Mountain Dew™.” (FG9, ID2)</p> <p>“My mom buys it from the store so we can have something to drink after we come home.” (FG2, ID1)</p>
Provided by adults at school	<p>“A teacher in our school is a cousin so she gives me one [a sugary drink], or I will ask one of the teachers.” (FG4, ID1)</p> <p>“Yeah, I don’t have no money, so I get the custodians to get it for us.” (FG4, ID 5)</p>

^f FG=focus group, ID=participant number

Table 4.

Children and adolescents report negative consequences of sugary drink intake

Adverse health effects	Select representative quotations (FG, ID) ¹
Gastrointestinal consequences	<p>"If I drink too much [of sugary drinks] I get really irritated and my stomach will start hurting, so I get moody." (FG1, ID4)</p> <p>"...the other drinks, like soda, sometimes it gives me cramps." (FG9, ID1)</p> <p>"[Drinking sugary drinks] kind of makes your head start hurting a little bit and basically make you feel uncomfortable." (FG3, ID2)</p> <p>"When I have too much soda it makes me feel like dizzy and gives me a headache, and after I get a headache I start to get irritated." (FG5, ID3)</p>
Headaches	"Once that sugar dies down and I'm not hyper anymore, I start getting sleepy and go to sleep." (FG5, ID1)
Fatigue	"Soda helps you stay woke all night, and you won't be able to fall asleep, and [so] the next day you'll just be tired in the morning." (FG5, ID2)
Chronic disease	"Soda [is] not really good for you [because of] the acid inside the soda that's like...It [sugary drinks] can give you like kidney problems and stuff." (FG3, ID1)
Hyperactivity	"[If you consume] a lot of sugar, you gonna get diabetes and you [will] have to go to the doctor..." (FG7, ID2)
	"Before I drink too much soda, I be calm and stay calm and focus and like [I'll] not be loud and stay calm and concentrate on what [I'm] doing. After you, like 15 minutes later, [I'll] be playing a lot, acting crazy." (FG5, ID2)
	"For me it's a mixture of good and bad, but I say it's [mostly] bad because sometimes it's just like jumping around and you can break something." (FG5, ID3)

¹FG=focus group, ID=participant number

Children and adolescents do whatever is needed to obtain sugary drinks (minor theme)

Table 5.

Consume sugary drinks even when difficult to obtain	Select representative quotations (FG, ID) ^f
Hide them from parents	<p>“[If I cannot have sugary drinks], I can just drink soda. I’ll put it in [a] water bottle and tell my mom it’s tea. Then I could just sneak in my room...and I drink it.” (FG2, ID2)</p> <p>“[If I cannot have sugary drinks], I don’t know. I would have to probably sneak and get it instead of letting my mom know...” (FG1, ID2)</p>
Replace them with homemade drinks	<p>“[If I cannot have soda], I just go to the store and buy some sugar.” (FG4, ID5)</p> <p>“One time I drunk lemon juice, [because] I didn’t have juice or soda. It was really sour and it made my stomach hurt a little bit, but [I liked that more than water].” (FG7, ID1)</p>

^fFG=focus group, ID=participant number