Evaluation of the Rethink Your Drink 9th-12th Grade Curriculum, 2017

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Executive Summary

Rethink Your Drink (RYD) is a California Department of Public Health (CDPH) Nutrition Education Obesity Prevention Branch (NEOPB) Initiative designed to provide nutrition education and develop skills, such as label reading, to help people make healthier beverage choices including water, fat-free or low-fat (1%) milk, and 100% juice in limited amounts. A Rethink Your Drink high school curriculum targeting students in grades 9-12 was developed in 2012. The curriculum promotes four key behaviors:

- Drink water instead of sugary drinks such as sodas, energy drinks, and juice drinks.
- Choose from a variety of healthy drink options such as water, 1% milk, fat-free milk, 100% fruit juice, or unsweetened tea or coffee over sugary drinks.
- Use the Nutrition Facts label to choose foods and beverages with less total sugars.
- Use the Ingredient List to choose foods and beverages with little or no added sugars.

The curriculum consists of four 50-60-minute lessons that build on one another and are designed to be taught over the course of several weeks. Learning objectives are to expand student understanding of the effects of excessive sugar consumption on health; increase awareness of which beverages students and their peers choose to drink and reasons for choosing those beverages; communicate the importance of accessing valid health information and teach students how to use the nutrition facts labels to compare sugar content of various beverages; identify and evaluate the internal and external influences that affect food and beverage choices; identify the steps of the decision-making process and use it to make healthier beverage choices.

An evaluation of the RYD curriculum was conducted by the University of California Nutrition Policy Institute in 2017 to address the following questions:

- What impacts did the RYD curriculum have on high school students' knowledge, attitudes and behaviors regarding sugar-sweetened and non-sugary drinks?
- What were teacher and student perceptions of the curriculum?
- What recommendations did teachers and students have for enhancing and improving the curriculum?

Evaluation methods included a 2-group pre-post test administered to intervention and comparison group students immediately prior to and following curriculum implementation; focus group discussions with intervention group students; an online survey of intervention group teachers; and semi-structured interviews with intervention group teachers. The student survey assessed behaviors, knowledge, self-efficacy, and attitudes, while student focus groups assessed perceptions of the curriculum and recommendations for improvements. The teacher survey assessed curriculum implementation, while the teacher interviews elicited perceptions of the curriculum and recommendations for improvements.

Key findings from the student survey include the following:

- With respect to consumption patterns, **there was no significant difference in the number of sugar sweetened beverages consumed**, such as soda, sports drinks and flavored milk, between intervention and comparison group students. However, the intervention was associated with a slight but statistically significant decrease in consumption of diet soda as well as with a small increase in the number of types of healthy drinks students chose when eating out (0.19; 95% CI: 0.05, 0.34).
- **Students exposed to the RYD curriculum reported increased use of nutrient labeling of beverages as compared to students not exposed to it.** Intervention students reported a small, but statistically significant greater increase in the frequency of reading the Nutrition Facts Label when choosing a drink compared to comparison group students (0.10; 95% CI: 0.03, 0.17).
- **The RYD curriculum had limited effects on knowledge associated with self-efficacy.** Intervention students reported a small but statistically significant greater increase in their understanding of reasons for choosing certain beverages as compared to comparison group students (0.19; 95% CI: 0.07, 0.32).
- **The RYD curriculum had no significant impacts on student attitudes** regarding consumption of sugar and sugary drinks**.**
- **Students receiving the RYD curriculum reported changes in the influence of two factors affecting beverage choice.** The intervention was associated with small but significant decreases in the self-reported amount of influence of number of calories in a drink (0.17; 95% CI: 0.11, 0.23) as well as beverage advertisements (0.18; 95% CI: 0.12, 0.24) on beverage choice.

Key findings from the teacher survey and interviews and student focus groups include the following:

- **Teachers felt positively about the curriculum.** Teachers agreed with the following statements regarding each of the lessons: “The training adequately prepared me to teach this lesson,” “I felt adequately prepared to teach this lesson,” and “The Content Standards helped identify the lesson’s fit with grade-level instruction requirements.”
- **Teachers believed that the lessons were well-aligned with learning objectives.** Nearly all teachers felt the lessons were “very” or “somewhat” well-aligned with the learning objectives presented for each lesson.
- **Teachers did not implement all components of the curriculum.** Due to lack of time and/or reluctance to burden students with additional homework, teachers consistently reported that they did not incorporate the last components of the curriculum.
- **The curriculum may be more effective with younger students.** Students felt that high school students have ingrained habits that can be hard to break, while teachers noted the information was redundant for some students, who had already been exposed to it.

The limited impact of the RYD curriculum on the key outcomes of interest, i.e. student intake of sugary drinks and healthy alternatives suggests that that this curricular approach alone may be insufficient to achieve behavior change on its own. That is consistent with the SNAP-Ed theory of change, which posits that a combination of educational approaches, policy systems and environmental change (PSE), and social marketing are required to achieve consistent and enduring behavior change. Evaluation findings suggest that the curriculum should be revised in accordance with the student and teacher feedback and implemented with complementary PSE and social marketing approaches.

Introduction

Rethink Your Drink (RYD) is a California Department of Public Health (CDPH) Nutrition Education Obesity Prevention Branch (NEOPB) Initiative designed to provide nutrition education and develop skills, such as label reading, to help people make healthier beverage choices including water, fat-free or low-fat (1%) milk, and 100% juice in limited amounts. Recent efforts to tax sugary drinks have raised awareness of their impact on health and have made efforts to promote healthy beverage choices particularly timely. NEOPB, which is funded by the United States Department of Agriculture Supplemental Nutrition Assistance Program-Education (SNAP-Ed), addresses rising obesity rates through statewide, regional, and local programs and partnerships that promote healthy eating, physical activity, and food security with an emphasis on communities with the greatest health disparities.

In 2009, the Bay Area Nutrition and Physical Activity Collaborative (BANPAC) launched the first multi-county Rethink Your Drink nutrition education campaign to encourage the consumption of water instead of sugary drinks. The campaign was implemented in six Bay Area counties: Alameda, Contra Costa, Marin, San Francisco, San Mateo and Santa Clara, and included consumer education as well as recommendations for environmental supports that partner organizations could implement to facilitate consumer choice and increase access to healthy beverages. The campaign was based on the Alameda County Public Health Department's successful Soda Free Summer Campaign, a season-long public health event that encouraged consumers to drink water instead of soda.

The 2010 *Dietary Guidelines for Americans (DGA)*, urged Americans to consume fewer added sugars, specifically from sodas and other sugary drinks.[i] In 2012, CDPH released a research brief based on the results of three statewide surveys on diet and physical activity practices among adults, teens, and children.[ii] The survey findings revealed that approximately half of California children, teens, and adults drank at least one serving of a sugary drink daily. The CDPH brief also highlighted associations between sugar sweetened beverage intake and demographic and socioeconomic factors; consumption of healthy and less healthy foods; health behaviors; psychosocial factors; and the home, work, and school environments. Based on these findings and direction from the DGA, California SNAP-Ed, with CDPH support, began to implement healthy beverage education statewide through local and regional efforts. Today, Rethink Your Drink is primarily implemented through SNAP-Ed- funded local partners.

This report presents the results of an evaluation of the Rethink Your Drink educational program designed for and implemented among 9th through 12th grade students. Previous evaluations of school-based curricula promoting healthy beverage choices among elementary age students have shown mixed results. Whereas some found self-reported reductions in sugary drink consumption[iii,iv] along with increased water consumption,[v] others found no changes in self-reported sugary drink or water consumption.[vi,vii] No studies with comparable curricula targeting high school youth were identified.

Background of the Rethink Your Drink High School Curriculum

The Rethink Your Drink high school curriculum emerged from a desire to provide skills-based healthy beverage instruction to adolescents, a group with high rates of sugar-sweetened beverage consumption. The lessons were developed to complement existing Rethink Your Drink materials, as well as other healthy beverage materials developed by the Alameda County Public Health Department, BANPAC, the Orange County Nutrition and Physical Activity Collaborative, the Northcoast Nutrition and Fitness Collaborative, and the Gold Country Health Eating Active Living Collaborative. In partnership with classroom teachers, whose feedback was included in 2011, and education and public health experts, NEOPB developed the Rethink Your Drink high school curriculum in 2012. The curriculum was pilot-tested at ten in- and after-school programs serving middle and high-school-aged youth around the state. The pilot test was evaluated by reviewers from CDPH, the California Healthy Kids Resource Center and the California Department of Education. Two school district coordinators also contributed recommendations for improvement. The materials were released for statewide implementation through SNAP-Ed funded projects in 2012. Since then, the materials have been revised to reflect the updated 2015-2020 DGAs and the curriculum has been shortened to ensure that the lessons can be completed within average class time of 50-60 minutes.

The RYD high school lessons incorporate nutrition and physical activity recommendations from the United States Department of Agriculture and the Department of Health and Human Services' *2015 Dietary Guidelines for Americans* and the *2008 Physical Activity* Guidelines, which emphasize the importance of balancing caloric intake with physical activity. One significant recommendation includes limiting caloric intake from soda, energy, and sports drinks—each a major source of added sugar and calories in the diet of many Americans.

The RYD curriculum is also based on the Health Education Content Standards for California Public Schools,[viii] which identify essential health knowledge and skills that students should have at each grade level, and the California Nutrition Competencies[ix] for grades 9-12, which identify nutrition knowledge and skills students need to make healthful food choices.

The RYD High School Curriculum promotes four key behaviors among students:

- Drink water instead of sugary drinks such as sodas, energy drinks, and juice drinks.
- Choose from a variety of healthy drink options such as water, 1% milk, fat-free milk, 100% fruit juice, or unsweetened tea or coffee over sugary drinks.
- Use the Nutrition Facts label to choose foods and beverages with less total sugars.
- Use the Ingredient List to choose foods and beverages with little or no added sugars.

Description of the Rethink Your Drink curriculum

The curriculum includes two lessons, each of which consists of two parts, for a total of four 50-60-minute sessions that are sequential, build on one another, and are designed to be taught over the course of several weeks. Each lesson contains an overview of its objectives, key

messages, materials, and additional references, and identifies California Health Education Content Standards, and California Nutrition Education Competencies addressed. Lesson components include a Warm Up, Main Activity, Cool Down, Check for Learning, Home Connection, and Extension/Links. Extension ideas and links to other core subject and content areas are included for greater application of the skills learned. The curriculum includes teacher resources, lesson outline, and lesson handouts. The estimated teacher preparation time is 20 minutes for each lesson.

Lesson 1 ("What's in Your Drink?") is divided into Lesson 1A "Learning the Facts" and Lesson 1B "Sugar Sleuths." Lesson 2 ("Think Before You Drink!") is divided into Lesson 2A "What Influences Your Health?" and Lesson 2B "Choosing Drinks for Health."

Lesson 1A's learning objectives are to expand understanding of the effects of excessive sugar consumption on overall health and to increase awareness of what beverages students and their peers choose to drink as well as reasons for choosing specific beverages. Activities include "Learning the Facts Cards Match-up" and "Learning the Facts Bingo," interactive activities in which students match facts and definitions or questions and answers. Lesson 1A has an optional homework activity in which students interview family members about beverages that they drink and how they feel about the health effects of their choices.

Lesson 1B's learning objectives are to communicate the importance of accessing valid health information and to teach students how to use the Nutrition Facts labels to compare sugar content of various beverages. Activities include "How Much Sugar," in which students learn to calculate the amount of sugar in different beverages using sugar cubes, and the "Nutrition Facts Scavenger Hunt," in which students learn to read the Nutrition Facts label. An optional homework activity consists of filling in a blank Nutrition Facts label worksheet with information about two drinks consumed at home.

Lesson 2A**'s** learning objectives are to identify and evaluate the internal and external influences that affect food and beverage choices. The "What Are My Influences?" activity promotes student awareness of the reasons behind beverage choices. The mandatory homework assignment, "Assessing My Drink Options," encourages students to think about the factors influencing their personal beverage choices.

Lesson 2B's learning objectives are to identify the steps of the decision-making process and how to use it to make healthier beverage choices. Lesson activities include the "Decision-Making Process," in which students discuss the results of the Lesson 2A "Assessing My Drink Options" homework assignment in small groups, and the "Choose a Healthy Drink Challenge," in which students commit to choosing healthier beverages based on an evaluation of values and consequences, and make a plan to carry out their decision. Students receive a "Healthy Beverage Highlights" handout summarizing all key messages after this lesson.

The need for a pilot test to examine program effectiveness and implementation challenges

An evaluation of this program was conducted by NPI in 2017. It was guided by the desire of the CDPH to better understand the benefits of the curriculum and ways in which implementation could be enhanced. The evaluation addressed the following questions:

- What impacts did the RYD curriculum have on high school students' knowledge, attitudes and behaviors regarding sugar-sweetened and non-sugary drinks?
- What were teacher and student perceptions of the curriculum?
- What recommendations did teachers and students have for enhancing and improving the curriculum?

Selecting sites for the pilot test

A list of high schools in Sacramento and Yolo Counties meeting the SNAP-Ed qualifying threshold of at least 50 percent of students eligible for free or reduced price meals and with comparable demographic characteristics, was compiled. CDPH staff contacted school administrators at qualifying schools to assess interest in participating in this effort. Administrators expressing interest directed CDPH staff to specific teachers, who were contacted by CDPH staff and offered a stipend for participation. Seven teachers at five schools agreed to participate. The final sample consisted of three intervention schools (two in Sacramento County and one in Yolo County) and two comparison schools (one in Sacramento County and one in Yolo County), with four and three teachers respectively. Three intervention group teachers volunteered to implement the curriculum in more than one class. The final intervention group consisted of eight classes, including Health (n=2 classes), AVID (college prep, n=2 classes), Economics (n=3 classes), and Physical Education (n=1 class). The comparison group consisted of three teachers with one class each: Health, Physical Education and Forensics. All students in intervention and comparison classrooms were eligible to participate in the evaluation. Participant demographics are presented in Table 1.

Methods used to examine the effectiveness of the curriculum

The RYD curriculum's impact on student knowledge, attitudes, and behaviors was assessed via pre/post-test survey administered in the classroom. An "opt out" letter was sent home to students' parents/guardians, providing information about the research and requesting that parents/guardians return a signed letter to the school if they did not want their child to participate in this piece of the evaluation. Students were informed they could decline to participate in the survey with no negative consequences.

Intervention group students completed the self-administered pre-test and post-test surveys during class time, two weeks prior to and three weeks following implementation of the

curriculum. Comparison group students completed the surveys within the same timeframe. Students who opted out of the Rethink Your Drink evaluation completed an alternate activity in order to remain indistinguishable from participants. Members of the research team proctored survey administration, and answered students' questions.

The student surveys included questions adapted from the NEOPB "What Do You Drink?" survey (unpublished) as well as newly-developed questions. Both pre-test and post-test surveys assessed student behaviors, knowledge, self-efficacy, and attitudes:

- *Behaviors:* frequency of consumption of sugar- and non-sugar sweetened beverages (times/day); preferred type of milk; most frequently consumed beverages at home, school and when out; frequency of reading the Nutrition Facts Label and Ingredients List when choosing a drink (4-point scale: Always, Usually, Sometimes, Never);
- *Knowledge:* ability to rank beverages based on sugar content, identify beverages with added sugar, identify the amount of sugar in a beverage, identify health impacts of sugar consumption and identify beverages with added sugar based on a review of the Nutrition Facts Label and Ingredients List; and understanding of the difference between naturally-occurring and added sugars (4-point scale: Very well, Somewhat well, Not very well, Not at all well);
- *Self-efficacy:* confidence in ability to identify a healthy beverage and find valid health information about different beverages (4-point scale: Very confident, Somewhat confident, Not very confident, Not at all confident); self-perception of extent to which they understand their reasons for choosing certain beverages (4-point scale: Very well, Somewhat well, Not very well, Not at all well);
- *Attitudes:* agreement with statements that "Consuming too much sugar can impact my health" and "I would like to drink fewer sweetened drinks" (5-point scale: Strongly agree, agree, don't agree or disagree, Disagree, Strongly disagree); and extent to which internal and external factors influence beverage choices (4-point scale: A lot, A little, Not much, Not at all).

All students who completed both the pre- and post-test survey were included in the analysis. In the analysis, ordinal categorical outcomes were treated as continuous outcomes and analysis of covariance was conducted on their change scores, controlling for pre-test scores. For binary outcomes, generalized estimating equations models were fit using proc genmod. All analyses were adjusted for grade, gender, and race/ethnicity, and accounted for clustering by teacher. All analyses were conducted using SAS 9.4.

Methods used to collect teacher and student feedback

Teacher and student input regarding the RYD curriculum was elicited via a survey of and interviews with intervention group teachers and focus groups with intervention group students. Teachers were asked to complete an online survey to provide feedback on the curriculum and

lesson implementation after teaching each lesson. To encourage timely response, links to the surveys were sent to teachers once a week on the day they were scheduled to teach each lesson. The survey elicited teacher perceptions regarding preparedness to teach the lesson; organization; clarity of instructions; time allocation; lesson flow; appropriateness of learning level; student engagement; appropriateness for diverse cultures and individuals; modifications; and feedback on individual lesson components.

In addition, semi-structured key-informant interviews were conducted with each of the intervention teachers within four weeks of completing the curriculum. The interviews elicited teacher perceptions of the curriculum, including how well the curriculum met its overall objective of increasing student knowledge and promoting healthy beverage choices, along with recommendations for improving the curriculum.

Two focus groups were conducted with 9th grade intervention group students at two schools within the four-week period following curriculum completion. Participation in the focus groups was on an "opt-in" basis, requiring signed parental consent and student assent. Letters were sent home to parents/guardians explaining the purpose of the focus groups and requesting signed consent for students to participate. Students were informed that they could decline participation in the focus groups with no negative consequences.

Twenty-one parents provided consent and thirteen students agreed to participate in focus groups (nine at one school, four at another), which lasted 23 and 40 minutes, respectively.

The focus groups took place during school hours in private classrooms at each school site. Each focus group was conducted by two members of the research team, with one facilitating and the other taking notes and asking occasional follow up questions. In addition, a school staff member was present at each focus group, in accordance with school regulations. To reduce potential bias, the school staff member was not intimately familiar with the students, sat at a distance from the focus group, and worked on unrelated material. A focus group script was used to reduce interviewer bias during discussions.

The focus groups elicited students' perceptions of the RYD curriculum, including: which components they felt were most effective in achieving the curriculum's objectives; which activities they would keep if they were to design a similar curriculum for high school students; how they would modify the curriculum to make it more engaging; and the curriculum's impacts on student knowledge, attitudes and behaviors regarding SSBs. Participant sex and race/ethnicity were recorded based on observation.

The key informant interviews and focus groups were audio recorded to supplement detailed notes. Interview and focus group results were analyzed using content analysis. In addition to

general findings, the analysis identified concordant and discordant emergent themes between student and teacher experiences and perspectives regarding RYD.

School protocol was followed for on-site visitation during all research activities. All research team members underwent a fingerprint scan (LiveScan); a credentialed K-12 teacher was present in the room at all times; and school sign-in/sign-out procedures were followed.

Description of the sample of students selected

The intervention group consisted of 248 9^{th}-12^{th} grade students in eight classrooms at three public high schools in Sacramento and Yolo Counties, CA. The comparison group consisted of 102 9^{th}-12^{th} grade students in three classrooms at two public high school in Sacramento and Yolo Counties, CA. The parent/guardian of one intervention group student returned a signed letter opting their student out of the survey. Two other students declined to participate in the survey.

Three hundred forty-nine students completed a pre-test survey ($n_{comparison}$=101, $n_{intervention}$=248) and 333 students completed a post-test survey ($n_{comparison}$=102, $n_{intervention}$=231). Students who did not complete both surveys were dropped from analyses, yielding a final sample of 222 intervention and 92 comparison students. There were no significant differences between intervention and comparison group students with respect to key demographic characteristics (Table 1).

Table 1. Demographics of students in intervention and comparison group, Rethink Your Drink Evaluation, Yolo and Sacramento Counties, CA, 2016-17 ($n_{comparison}$ = 92, $n_{intervention}$ = 222)

	Comparison Group		Intervention Group		p-value[2]
	n	% (SE)[1]	n	% (SE)[1]	
Gender					
Male	47	51.09 (7.10)	114	51.35 (4.85)	0.174
Female	38	41.30 (4.52)	104	46.85 (5.24)	
Other	5	5.43 (2.21)	3	1.35 (1.06)	
Missing	2	2.17 (2.03)	1	0.45 (0.43)	
Grade					
9th	50	54.35 (27.79)	84	37.84 (26.21)	0.856
10th	6	6.52 (6.10)	23	10.36 (9.97)	
11th	15	16.30 (13.61)	31	13.96 (13.43)	
12th	15	16.30 (13.61)	84	37.84 (29.56)	
Missing	6	6.52 (3.18)	0	0.00 (0.00)	
Race/Ethnicity					
Multiple	11	11.96 (4.83)	47	21.17 (1.73)	0.866
Asian	13	14.13 (6.13)	26	11.71 (7.00)	
Black/African American	5	5.43 (5.08)	7	3.15 (1.72)	
Latino	47	51.09 (8.26)	108	48.65 (13.24)	
White	14	15.22 (3.06)	31	13.96 (3.98)	
Missing	2	2.17 (1.07)	3	1.35 (0.60)	

[1]Percents adjusted for clustering by teacher.

[2]Differences in categorical variables between comparison and intervention groups by chi-square test. Boldface indicates statistical significance at p<0.05.

Impact of the RYD curriculum on student knowledge, attitudes and behavior

Student survey findings regarding impacts of the RYD curriculum on student knowledge, attitudes and behavior are presented below.

With respect to consumption patterns, **there was not a significant difference in the number of sugar sweetened beverages consumed**, such as soda, sports drinks and flavored milk, between intervention and comparison group students. However, the intervention was associated with a slight but statistically significant decrease in consumption of diet soda as well as with a small increase in the number of types of healthy drinks students chose when eating out (0.19; 95% CI: 0.05, 0.34) (Table 2).

Table 2: Impact of Rethink Your Drink curriculum on dietary behaviors regarding sugar- and non-sugary drinks, Rethink Your Drink Evaluation, Sacramento and Yolo Counties, 2017.

	Intervention Group		Comparison Group		Adjusted[1] Mean Difference in Change Between Intervention and Comparison (95% Confidence Interval)	p-value
	n	Adjusted[1] Mean Change (post-pre)	n	Adjusted[1] Mean Change (post-pre)		
Dietary behaviors in the last 24 hours						
Consumption of regular soda (containers/glasses/bottles/cans)	208	-0.10	82	0.06	-0.16 (-0.42, 0.10)	0.23
Consumption of diet soda (containers/glasses/bottles/cans)	205	0.03	81	0.12	-0.10 (-0.18, -0.02)	**0.02**
Consumption of 100% juices (containers/glasses/bottles/cans)	210	0.00	82	-0.05	0.06 (-0.11, 0.22)	0.50
Consumption of fruit drinks and fruit nectars (containers/glasses/bottles/cans)	205	0.11	80	0.18	-0.07 (-0.28, 0.14)	0.52
Consumption of sports drinks (containers/glasses/bottles/cans)	210	-0.32	83	-0.32	0.01 (-0.25, 0.26)	0.95
Consumption of energy drinks (containers/glasses/bottles/cans)	213	-0.08	83	-0.08	0.01 (-0.09, 0.10)	0.93
Consumption of flavored milk and milk type drinks (containers/glasses/bottles/cans)	212	0.20	84	0.16	0.04 (-0.11, 0.19)	0.61
Consumption of regular plain white milk or milk substitutes (containers/glasses/bottles/cans)	210	-0.16	84	-0.17	0.01 (-0.20, 0.22)	0.90
Consumption of reduced fat plain white milk (containers/glasses/bottles/cans)	210	-0.19	83	-0.11	-0.08 (-0.29, 0.12)	0.44
Consumption of sweetened coffee and tea drinks (containers/glasses/bottles/cans)	213	-0.10	84	-0.14	0.04 (-0.01, 0.08)	0.11
Consumption of unsweetened coffee and tea drinks (containers/glasses/bottles/cans)	209	0.11	84	0.14	-0.03 (-0.15, 0.09)	0.59

	Intervention Group		Comparison Group		Adjusted[1] Mean Difference in Change Between Intervention and Comparison (95% Confidence Interval)	p-value
	n	Adjusted[1] Mean Change (post-pre)	n	Adjusted[1] Mean Change (post-pre)		
Consumption of flavored waters (containers/glasses/bottles/cans)	210	-0.31	83	-0.19	-0.11 (-0.32, 0.10)	0.29
Consumption of plain water (tap or bottled) (containers/glasses/bottles/cans)	215	0.04	84	0.15	-0.11 (-0.30, 0.08)	0.24
Frequency of drinking from the water fountain (number of times)	217	0.24	83	0.20	0.04 (-0.22, 0.30)	0.76
Dietary behaviors: General						
Number of types of unhealthy drinks[2] chosen at school cafeteria (out of 5)	130	0.18	60	0.12	0.06 (-0.04, 0.17)	0.25
Number of types of healthy drinks[3] chosen at school cafeteria (out of 5)	129	0.17	60	0.20	-0.03 (-0.25, 0.18)	0.76
Number of types of unhealthy drinks[2] chosen when eating out (out of 5)	219	0.05	84	0.05	0.00 (-0.21, 0.20)	1.00
Number of types of healthy drinks[3] chosen when eating out (out of 5)	219	-0.25	84	-0.44	0.19 (0.05, 0.34)	**0.01**
Number of types of unhealthy drinks[2] chosen when bringing lunch to school (out of 5)	164	-0.11	70	-0.05	-0.06 (-0.27, 0.14)	0.56
Number of types of healthy drinks[3] chosen when bringing lunch to school (out of 5)	164	-0.12	70	0.01	-0.13 (-0.31, 0.05)	0.17
Number of types of unhealthy drinks[2] chosen at/brought to school (out of 5)	212	0.13	81	0.12	0.01 (-0.17, 0.19)	0.89
Number of types of healthy drinks[3] chosen at/brought to school (out of 5)	206	0.23	78	0.28	-0.06 (-0.19, 0.08)	0.42

[1]Adjusted for baseline, grade, gender, and race/ethnicity.

[2]Unhealthy drinks include regular soda; diet soda; fruit drinks (not 100% juice, not diet); sweetened coffee or tea drinks (not diet); flavored milk or milk drinks (hot chocolate, yogurt drinks, smoothies).

[3]Healthy drinks include 100% fruit juice; unsweetened coffee or tea drinks; plain white milk or milk substitutes (soy, almond, rice milk, etc.); bottled water (plain or sparkling); tap water.

Students exposed to the RYD curriculum reported increased use of nutrient labeling of beverages as compared to students not exposed to it. Intervention students reported a small, but statistically significant greater increase in the frequency of reading the Nutrition Facts Label when choosing a drink compared to comparison group students (0.10; 95% CI: 0.03, 0.17) (Table 3).

Table 3: Impact of Rethink Your Drink curriculum on nutrition knowledge behaviors, Rethink Your Drink Evaluation, Sacramento and Yolo Counties, 2017.

	Intervention Group		Comparison Group		Adjusted[1] Mean Difference in Change Between Intervention and Comparison (95% Confidence Interval)	p-value
	n	Adjusted[1] Mean Change (post-pre)	n	Adjusted[1] Mean Change (post-pre)		
Frequency read the Nutrition Facts Label (4 point Likert scale[2])	217	0.11	82	0.01	0.10 (0.03, 0.17)	**0.01**
Frequency read the Ingredients List (4 point Likert scale[2])	216	0.22	84	0.16	0.06 (-0.03, 0.15)	0.16
Ability to read Nutrition Facts Label	175	0.09	64	0.07	0.02 (-0.20, 0.25)	0.85

[1]Adjusted for baseline, grade, gender, and race/ethnicity.
[2]All 4 point scales have values from never (1) - always (4).

The RYD curriculum had limited effects on knowledge associated with self-efficacy.
Intervention students reported a small but statistically significant greater increase in their understanding of reasons for choosing certain beverages as compared to comparison group students (0.19; 95% CI: 0.07, 0.32) (Table 4).

Table 4: Impact of Rethink Your Drink curriculum on nutrition knowledge and self-efficacy, Rethink Your Drink Evaluation, Sacramento and Yolo Counties, 2017.

	Intervention Group		Comparison Group		Adjusted[1] Mean Difference in Change Between Intervention and Comparison (95% Confidence Interval)	p-value
	n	Adjusted[1] Mean Change (post-pre)	n	Adjusted[1] Mean Change (post-pre)		
Confidence in ability to identify healthy beverages (4-point Likert scale[2])	215	0.14	80	0.17	-0.03 (-0.16, 0.10)	0.62
Understanding of reasons for choosing certain beverages (4-point Likert scale[3])	215	0.29	82	0.10	0.19 (0.07, 0.32)	**<0.01**
Confidence in ability to find valid health information about beverages (4-point Likert scale[2])	214	0.27	81	0.38	-0.11 (-0.29, 0.08)	0.26
Understanding of difference between natural and added sugars (4-point Likert scale[3])	215	0.36	82	0.26	0.10 (-0.03, 0.23)	0.13
Number of drinks correctly identified as containing sugar (out of 4)	219	0.25	84	0.22	0.03 (-0.23, 0.30)	0.81
Number of drinks correctly identified as containing added sugar (out of 13)	219	-0.02	84	0.02	-0.04 (-0.35, 0.26)	0.78
Number of ingredients correctly identified as being types of added sugar (out of 5)	219	0.38	84	0.07	0.31 (-0.06, 0.68)	0.10
Number of health conditions correctly identified as result of consuming a lot of sugar (out of 5)	219	0.17	84	0.21	-0.05 (-0.28, 0.19)	0.70

[1]Adjusted for baseline, grade, gender, and race/ethnicity.
[2]Values from not at all confident (1) – very confident (4).
[3]Values from not at all well (1) – very well (4).

The RYD curriculum had no significant impacts on student attitudes regarding consumption of sugar and sugary drinks (Table 5)**.**

Table 5: Impact of Rethink Your Drink curriculum on attitudes regarding consumption of sugar and sugary drinks, Rethink Your Drink Evaluation, Sacramento and Yolo Counties, 2017.

	Intervention Group		Comparison Group		Adjusted[1] Mean Difference in Change Between Intervention and Comparison (95% Confidence Interval)	p-value
	n	Adjusted[1] Mean Change (post-pre)	n	Adjusted[1] Mean Change (post-pre)		
Agreement with statement: I would like to drink fewer sweetened drinks (5-point Likert scale[2])	198	0.06	74	-0.04	0.10 (-0.10, 0.30)	0.32
Agreement with statement: Consuming too much sugar can affect my health (5-point Likert scale[2])	215	0.04	80	0.03	0.01 (-0.13, 0.15)	0.91

[1]Adjusted for baseline, grade, gender, and race/ethnicity.
[2]Values from strongly disagree (1) – strongly disagree (5).

Students receiving the RYD curriculum reported changes in the influence of two factors affecting beverage choice. The intervention was associated with small but significant decreases in the self-reported amount of influence of number of calories in a drink (0.17; 95% CI: 0.11, 0.23) as well as beverage advertisements (0.18; 95% CI: 0.12, 0.24) on beverage choice (Table 6).

Table 6: Impact of Rethink Your Drink curriculum on factors influencing beverage choice, Rethink Your Drink Evaluation, Sacramento and Yolo Counties, 2017.

	Intervention Group		Comparison Group		Adjusted[1] Mean Difference in Change Between Intervention and Comparison (95% Confidence Interval)	p-value
	n	Adjusted[1] Mean Change (post-pre)	n	Adjusted[1] Mean Change (post-pre)		
Taste (4-point Likert scale[2])	211	0.02	81	-0.01	0.03 (-0.04, 0.10)	0.39
Cost (4-point Likert scale[2])	209	0.20	81	0.17	0.03 (-0.12, 0.18)	0.67
What friends drink (4-point Likert scale[2])	210	0.20	79	0.19	0.02 (-0.11, 0.15)	0.80
What family drinks (4-point Likert scale[2])	211	0.13	80	0.07	0.07 (-0.08, 0.21)	0.38
Amount of sugar in the drink (4-point Likert scale[2])	208	0.19	80	0.09	0.10 (-0.02, 0.23)	0.10
Number of calories in the drink (4-point Likert scale[2])	210	0.01	80	-0.16	0.17 (0.11, 0.23)	**<0.01**
Whether the drink is healthy (4-point Likert scale[2])	210	0.11	81	0.01	0.09 (-0.10, 0.28)	0.34
Ads for the drink (4-point Likert scale[2])	210	0.15	80	-0.03	0.18 (0.12, 0.24)	**<0.01**
Whether the drink gives energy (4-point Likert scale[2])	209	0.51	80	0.40	0.11 (-0.04, 0.26)	0.14
Whether the drink has vitamins, minerals, or protein (4-point Likert scale[2])	210	0.11	80	-0.01	0.12 (-0.07, 0.31)	0.21
Whether the drink helps concentrate (4-point Likert scale[2])	207	0.25	80	0.38	-0.13 (-0.31, 0.06)	0.17
Whether the drink helps stay hydrated (4-point Likert scale[2])	211	0.22	79	0.24	-0.02 (-0.21, 0.17)	0.82

[1]Adjusted for baseline, grade, gender, and race/ethnicity.

[2]Values from a lot (1) – not at all (4).

Synthesis of feedback from teachers and students regarding implementation of the RYD curriculum

The teacher survey and interviews and student focus groups elicited perceptions of the curriculum and recommendations for improvements, including these key findings:

Teachers felt positively about the curriculum. The teachers agreed with the following statements regarding each of the lessons: "The training adequately prepared me to teach this lesson," "I felt adequately prepared to teach this lesson," and "The Content Standards helped identify the lesson's fit with grade-level instruction requirements."

Teachers believed that the lessons were well-aligned with learning objectives. Nearly all teachers felt the lessons were "very" or "somewhat" well-aligned with the learning objectives presented for each lesson. All teachers reported that the nutrition education competencies helped them understand the lesson's fit with health education content standards.

Teachers did not implement all components of the curriculum. Due to lack of time and/or reluctance to burden students with additional homework, teachers consistently reported that they did not incorporate the last components of the curriculum, including the "Cool Down," "Check for Learning" and "Extension/Links." Future versions of the curriculum may wish to consider omitting those components, particularly considering that even teachers receiving a stipend in this pilot study did not implement them.

Teachers and students believe that the curriculum would be most effective with younger students. Some students felt that the RYD curriculum might be more suitable for middle or elementary students, noting that high school students have ingrained habits that may be hard to break. A student explained that, "we already have. . . habits and . . . can't really break them." Some students also reported learning the same information found in the RTYD curriculum in middle school. A student commented that, "the learning was kind of repetitive because . . . in [middle school] Health Science they . . . already teach you this . . . so I still remember it." That was corroborated by a teacher, who felt the curriculum "would be better for a middle school level," noting that "a lot of students said they already learned this in health [class]."

Were the curriculum objectives achieved?

Students reported beneficial changes in knowledge, including awareness of nutrition facts labels. Focus group participants reported increased awareness of the impact of sugary drinks. For example, one said the RYD curriculum helps "people realize how much sugar. . . affects your body." Students cited increased ability to read nutrition facts labels and calculate the amount of sugar in beverages with one saying, for example, "I can read…the nutrition label easier and calculate how much sugar is in [a beverage]."

Increased student knowledge was not always associated with behavior change. One focus group participant said: "I'll look at the nutrition label, but I just like figuring out how much sugar is in it for fun; I'll still drink it." (A similar phenomenon was reported by Jensen at al.,[x] who found increased reading of nutrition facts labels with no change in the use of labeling to choose food items.)

Behavior change occurred, but on a limited scale. A small number of focus group participants reported behavior changes, including drinking lower fat milk at home, drinking more water and choosing smaller portions of sugary drinks. A small number of focus group students also reported asking their parents to stop drinking soda and to prepare healthy beverages from the recipe cards provided as part of the curriculum.

Teacher interviews and student focus groups provided specific feedback on each of the four Rethink Your Drink lessons

Lesson 1A: "Learning the Facts Cards" and "Learning the Facts Bingo"
Most students and teachers praised the social component and interactive nature of this lesson, but many students were already familiar with the information it provided and felt the "Learning the Facts" cards' content could be improved by providing additional facts about SSBs. Further, some students were concerned that the information provided in Learning the Facts Bingo simply restated facts already presented by the Learning the Facts Cards. While 3 of the 4 teachers interviewed praised the fact that students got out of their seats and moved around for these activities, one teacher had reservations about movement around a crowded classroom.

Lesson 1B: "How Much Sugar"
When assessing Lesson 1B, students and teachers focused on increases in knowledge about the sugar content of various beverages. They agreed that the tactile and visual aspects of this lesson successfully reinforced the RYD message. Students felt this activity was impactful because it allowed them to visually see and feel the amounts of sugar actually contained in SSBs. For example, one said: "I liked it when like they showed the actual sugars cubes. That actually helped me see like how much sugar is actually in it." Teachers also appreciated that students could "touch and feel sugar cubes. [The] kids were like 'Wow.' [It] hit home with them."

Lesson 2A: "What Are My Influences"
This activity, designed to identify and evaluate influences that affect food and beverage choices, was well-received by both students and teachers. As a student explained, "I liked that [activity]. . . because it made us realize. . . what influences us." Teachers felt students found the activity engaging because it allowed them to discuss their personal lives. A teacher explained that "for many students, this activity is the first time that they were asked to connect how they

are influenced to how these influences affect their choices. They enjoyed talking about their life and reasons why they choose certain drinks." Another noted that students "really got into it and talked about family and how they make certain choices…and understand and feel the pressures when around other friends."

Lesson 2B: "Decision Making Process" (with consideration of Lesson 2A's "Assessing My Drink Options" homework assignment) and "Choose a Healthy Drink Challenge"

The goal of this lesson was to identify and evaluate varied influences on food and beverage choices. Student and teacher responses to both "Decision Making Process and the "Choose a Healthy Drink challenge" were mixed. "Decision-Making Process," in which students considered responses to the "Assessing my Drink Options" homework assignment, was not very well received by some students. They found the decision-making process overly complex with respect to what they felt was a relatively straightforward choice between healthy and unhealthy beverages. Teachers corroborated student dislike of this activity, noting that it felt redundant with other lessons. As one teacher noted, "As 11th and 12 graders (16-18 [years old]), they were polite about my instructions, but seemed a bit bored." This was echoed by another teacher, who felt that "it was kind of a boring lesson. Lots of me talking at them and then a worksheet they did by themselves. The students were not as into it as the other lessons." However, a 9th grade teacher said that students found this activity challenging, and recommended that having two or three concrete complete examples using the steps in the Decision Making Model would be very helpful." Another teacher recommended "bring out [the] beverage labels again. Bring out images of various beverages and say, 'So which one are you going to choose now?'." Teachers also felt the instructions need to provide more explanation of terminology.

Students and teachers also expressed mixed opinions about the "Choose a Healthy Drink Challenge" activity. Students suggested that the activity should include settings beyond the school environment. As one explained: "We only have like three drinks at school: chocolate milk, milk, and water, so…it was a bit hard to answer the question, 'Which [drink] would [you] choose?' when there's [not much to choose from]." Students and teachers felt that Lesson 2B could potentially be eliminated from future versions of the curriculum. As a teacher explained, "I wouldn't teach [Lesson 2B] again…. It was boring and felt redundant for a lot of the information in this lesson. I think by now they have learned what are good and what are poor beverage choices."

Teachers and students provided several concrete recommendations for improving the curriculum. These included:

- Reducing the curriculum to three lessons (1A, 1B and 2A).

- Improving flow by designing the curriculum as a single unit to be taught over several consecutive days rather than several weeks, allowing teachers to continue teaching incomplete activities the following day.
- Targeting younger students to prevent the adoption of unhealthy habits that may become ingrained by high school.
- Including PowerPoint type slides (which several teachers had developed on their own) to make the curriculum more engaging for students and easier for teachers to impart.
- Providing healthy drinks for students to sample, greater use of technology and online activities, more games, and more opportunities for social interaction.

Study strengths and limitations

Study strengths include a pre-post design with both an intervention and a comparison group and the use of mixed qualitative and quantitative methods to elicit teacher and student feedback to inform modifications of the RYD curriculum. Teachers and students provided a range of recommendations for modifying the RYD curriculum in areas including lesson organization, appropriateness of learning level, time allocation and student engagement.

This study also had several limitations. Intervention and comparison group teachers received a stipend for participation in the research, which may have influenced curriculum implementation and may have also led to social desirability bias, resulting in more positive survey responses than might have otherwise been the case. The provision of stipends and the in-person training of the teachers may limit the generalizability of the findings, given that is it not likely that these components would be feasible should the curriculum be implemented on a larger scale. The limited number of teachers who were willing to participate also limited the generalizability of their experience with the curriculum. Limitations of the focus groups include possible self-selection bias.

Implications for Future Efforts

The limited impact of the RYD curriculum on the key outcomes of interest, i.e. student intake of sugary drinks and healthy alternatives suggests that that this curricular approach alone is insufficient to achieve behavior change. This is consistent with the SNAP-Ed theory of change, which posits that a combination of educational approaches, policy systems and environmental change, and social marketing are required to achieve consistent and enduring behavior change. Furthermore, students and teachers alike noted that some of the curriculum was redundant with lessons received in earlier grades and that in general this material is more likely to have impact with younger students, whose habits may be less engrained. Several suggestions were made for improving the lessons, eliminating less well-received components, and restructuring and shortening the curriculum to increase feasibility and receptivity on the part of students and teachers. These findings suggest that the curriculum should be: 1) revised in accordance with

the suggested feedback described in the report; 2) implemented with complementary PSE and social marketing approaches; and 3) that after these modifications are made the comprehensive intervention should be evaluated exactly as it is intended for large scale dissemination, i.e. without components such as stipends and in-person training which are not feasible for widespread program implementation. Furthermore, PSE approaches could be even more impactful if they were to include the broader community where students live. This is true particularly in areas where schools have already implemented strong sugar sweetened beverage school policies limiting student acquisition of these products.

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