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Physical Changes In The Home Environment To Reduce Television Viewing And Sugar Sweetened Beverage Consumption Among 5-12 Year Old Children: A Randomized Pilot Study

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Abstract

This study evaluated the feasibility of a home-based intervention to reduce sugar sweetened beverage intake and television viewing among children. Lower-income parents of overweight children ages 5-12 yrs (n=40) were randomized to a home environment intervention to reduce television viewing with locking devices and displace availability of sugar sweetened beverages with home delivery of non-caloric beverages (n=25), or to a no-intervention control group (n=15) for six months. Data were collected at baseline and six months. After six months, television viewing hours per day was significantly lower in the intervention group compared with the control group (1.7 [se=.02] vs. 2.6 [se = .25] hrs/day, respectively, $p < .01$). Sugar sweetened beverage intake was marginally significantly lower among intervention group compared to control group children (0.21 [se=.09] vs. 0.45 [se=.10], respectively, $p < .09$). BMI z-score was not significantly lower among intervention compared to control children. Among a lower-income sample of children, a home-based intervention reduced television viewing, but not sugar-sweetened beverage intake or BMI z-score.

Keywords

pediatric obesity prevention; television viewing; sugar sweetened beverages

Sugar sweetened beverage intake (1-3) and television viewing (4-6) are consistently positively related to obesity among children. The home environment is where children consume most of their sugar sweetened beverages (7), and where most television viewing occurs (4,8-9). Previous home interventions have shown success in reducing intake of sugar sweetened beverages among adolescents (10-11) and reducing children's television viewing time and body mass index (12-14).

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Conflict of Interest

The authors have no conflict of interest to report.

Low-income and ethnic/racial minority children experience higher rates of obesity (15-16) and two associated behaviors, sugar sweetened beverage intake (16-17) and television viewing (4-6). The present pilot study was designed to evaluate the feasibility and acceptability of a combined home beverage delivery and television viewing locking device obesity prevention intervention in a low-income, diverse sample of families with children.

Eligibility criteria were: 1) child BMI ≥ 85th percentile for age and sex (18); 2) child age between 5-12 years; 3) child drank a sugar sweetened beverage the day before screening or child watched ≥ 2 hrs of television or video games the day before screening; 4) parent willing to be randomized to intervention or comparison group; 5) parent speaks English or Spanish; and 6) family able to participate for six months (no plan to move from the area). Households that completed baseline data collection were randomized to intervention or control group. Randomization was 5:3 (intervention: control).

Measures were collected at baseline and six months by two trained data collection research staff in the participants' home. Child height was measured to the nearest 0.1 cm using a free-standing stadiometer. Weight was measured to the nearest 0.1 kg using a research precision grade, calibrated digital scale (Seca Corp, Hanover MD). BMI z-scores for age and sex were calculated according to the 2000 CDC standards (18). Dietary intake was measured by previous day 24-hour recall interviews for two weekdays and one weekend day using NDS-R software (19). Dietary data were collected by trained and certified interviewers in-person or over the telephone in English or Spanish. Physical activity was measured using the GT1M accelerometry monitor (Actigraph, Pensacola, FL) (20). The valid wear time criteria (minimums) are four days (three weekdays and one weekend day) of at least six hours of activity between 5:00am and 11:59pm. Minutes of moderate to vigorous-intensity physical activity were calculated (21).

The two central home environment intervention components were non-caloric beverage delivery and television locking devices. The intervention was implemented using an initial home visit by an intervention staff member, followed by five monthly telephone calls. Television locking devices were attached to every working television in the home at the home visit. The number of hours watched on each television by each family member per day was estimated by the participating parent. The number of hours programmed on the devices was discussed and agreed upon by the interventionist and parent. The recommended number of hours programmed for the child was < 2 hrs/day. Households could choose whether to program more than one pin number to operate the television locking device, and whether to program hours for each individual household member.

Of the 25 intervention households, 10 had locking devices placed on all televisions, 8 had locking devices placed on some televisions, and 7 had locking devices placed on no televisions (primarily due to incompatibility between the device and the television equipment). Changes in the number of hours programmed into the TV locking device could be done only by the intervention staff, not the parent or any other household member. Over the six month study, three households further decreased the amount of time programmed for their televisions and one household increased the amount of time programmed for their televisions. The average hours per person per week programmed for the televisions was 13.1

(sd = 10.2). For all households, the amount programmed was lower than their baseline level of TV viewing hours.

The intervention staff worked with parents and children to limit screen time on all devices. However, only the television locking device physically prevented the screen from being turned on. For phones and other small screens, the intervention staff worked with parents to limit child use and implement family home rules about when, where and how much screen use was permitted.

Beverage delivery began one week following the home visit (13-14). Study staff worked with a local online grocery-delivery service to order and deliver non-caloric beverages to intervention participant homes once every two weeks. At the initial home visit, intervention staff reviewed the beverage choices with participants and recorded the participant choices. Choices included non-caloric unflavored and flavored, sparkling and still waters, unsweetened teas, and artificially sweetened waters and carbonated beverages. The approximate number of sugar sweetened beverages per day consumed by every person in the household was estimated by the participating parent with help from the interventionist. This number was multiplied by 14 days and the total number of non-caloric beverages was delivered to the home every two weeks. The rationale for estimating total household beverage consumption was to displace all sugar sweetened beverages in the household and to avoid competition among household members for the delivered beverages.

Television locking devices and beverage delivery continued for six months. Telephone contacts were conducted by intervention staff using a standard protocol and motivational interviewing techniques to help parents set goals and make changes in the home environment around sugar sweetened beverage intake and television viewing.

At follow up, 38 of 40 children were measured for weight and height. Table 1 shows demographic and household variables at baseline. Eighty-eight percent of parents completed 4 or the maximum dose of 5 intervention phone calls. Duration of phone calls averaged 17 (sd=7) mins. Mean total drinks ordered by intervention households was 202 servings per two weeks (sd = 106; range 34 to 465 servings). Of the 25 intervention households, 10 had locking devices placed on all televisions, 8 had locking devices placed on some televisions, and 7 had locking devices placed on no televisions (primarily due to incompatibility between the device and the television equipment). The average time programmed for the televisions was 13.1 (sd = 10.2) hours per person per week. Eighty-eight percent of parents reported that the drink delivery was very helpful in limiting the consumption of sugar-sweetened beverages the child consumed during the study period. Eighty-seven percent reported that the television devices were helpful in limiting the amount of television the child watched during the study. Eighty-nine percent reported that the support received from the home interventionist was very helpful.

Table 2 shows mean values of the intervention target variables at six months, adjusted for baseline value. The intervention group’s television viewing was significantly lower at follow up compared with the control group (1.7 [se=.02] vs. 2.6 [se = .25] hours/day, respectively, $p < .01$). Sugar sweetened beverage intake was marginally significantly lower among children

in the intervention group compared with the control group (0.21 [se= .09] vs. 0.45 [se= .10] servings per day, respectively, $p < .09$). No significant intervention effects were observed for child BMI z-score at six months (1.8 [se = 0.04] vs. 1.8 [se = 0.05] respectively, $p < .31$). Unexpectedly, BMI percentile was marginally significant in the direction opposite expectation (intervention: 95.2 [se=.57]; control: 93.5 [se=.71], $p < .07$). Small sample size, variability of childrens' growth patterns at this age, and high variability in the upper tail (> 95th percentile) of the BMI percentile distribution may have contributed to this result (22).

The results of the study show promise for changing two behaviors that contribute to childhood obesity and excess weight gain. Television-limiting devices placed on all or most of the televisions in their home and non-caloric beverage delivery for the six-month intervention period were well-accepted by families. Children in intervention homes significantly decreased their television viewing time compared to children in control homes. Decrease in consumption of sugar-sweetened beverages among children in intervention homes was marginally significant compared with children in the control group. These findings are consistent with previous childhood obesity prevention interventions, many of which report significant intervention effects on child behaviors but not child BMI (8,13-14). Limitations of the study include the small sample size, and the relatively low baseline level of sugar sweetened beverage intake among the participating children, which could have influenced the ability of the intervention to further reduce intake.

Low income, racially and ethnically diverse families and children experience obesity at higher rates than more educated, higher income families and children. An important issue is whether interventions are effective or translatable to the populations that experience these health risks most severely. The fact that the intervention was implemented with good fidelity among socioeconomically challenged families speaks to its potential for changing the family home environment and child obesity-related behaviors in this high-risk population.

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Table 1
Baseline Demographic, Home and Behavior Variables (N=40)

Demographic Variables:	M (sd)	%
Child Age (yrs)	9.0 (2.2)	
Child Sex (female;%)		50.0
Child Hispanic (%)		70.0
Child BMI percentile	95.2 (4.4)	
Child BMI z-score	1.8 (0.47)	
Child Weight Status (%)		
Overweight (≥85th<95th)		32.5
Obese (>95th)		67.5
Parent age (yrs)	36.6 (6.1)	
Parent BMI Kg/m2	31.6 (5.9)	
Household Income (%)		
$<25,000		42.5
$25-49,999		37.5
$50-75,000		15.0
$≥ 75,000		5.0
Number of Children in Household (%)		
1		20.0
2		37.5
3		25.0
4		12.5
5		5.0
Number of Adults In Household (%)		
One		25.0
Two		57.5
Three+		17.5
Parent Employment (%)		
Not for pay		47.5
Part time		25.0
Full time		27.5

Child Behavioral Variables	M (sd)	%
Physical activity (moderate/vigorous mins/day)	49.0 (21.4)	
Sedentary (mins/day)	829.4 (152.5)	
Dietary Intake (24-hour recall:servings/day)		
Sugar-sweetened		

Child Behavioral Variables	M (sd)	%
Beverages (12 oz)	0.6 (0.6)	
Juice (100%)	0.6 (0.7)	
Television Viewing (hours/day)	3.0 (1.1)	
Video Games (hours/day)	1.5 (1.3)	
TV on at home (%)		
Never		7.5
A little of the time		22.5
Some of the time		35.0
Most of the time		35.0
TV on during meals (%)		
Never		27.5
A little of the time		30.0
Some of the time		15.0
Most of the time		27.5
Child eats while watching TV (%)		
Never		20.0
A little of the time		32.5
Some of the time		35.0
Most of the time		12.5
TV in child bedroom (yes; %)		52.5
TV rules (no;%)		35.0
Video Game rules (no;%)		42.5
Computer rules (no;%)		40.0
Home Televisions (N)		
1		22.5
2		35.0
3		25.0
≥4		17.5
Home Drink Availability		
(in home last week)		
Regular Soda (yes;%)		55.0
Fruit Juice (yes:%)		67.5
Sports Drink (yes;%)		40.0
Sweet Drink (yes:%)		60.0
Parent Self Efficacy		
Confident keep TV from bedroom or remove from bedroom		
Not confident		12.5
Somewhat confident		20.0
Very confident		30.0

Child Behavioral Variables	M (sd)	%
Extremely confident		37.5
Confident limit TV to < 2 hrs/day		
Not confident		5.0
Somewhat confident		25.0
Very confident		52.5
Extremely confident		17.5
Confident have child drink water instead of soda		
Not confident		0.0
Somewhat confident		20.0
Very confident		62.5
Extremely confident		17.5

Table 2

Six-Month BMI, Television Viewing Time And Sugar-Sweetened Beverage Intake By Treatment Group (Adjusted Mean, Standard Error)

	Control	Intervention	p
N	15	25	
BMI z-score	1.8 (0.05)	1.8 (0.04)	.31
BMI percentile	93.5 (0.71)	95.2 (0.57)	.07
Television Viewing (hours/day)	2.6 (0.25)	1.7 (0.20)	.01
Video Games (hours/day)	1.5 (0.24)	1.1 (0.19)	.14
Sugar-sweetened Beverage (servings/day)	0.45 (0.10)	0.21 (0.09)	.09
100% Juice (servings/day)	0.39 (0.12)	0.20 (0.10)	.23
Combined sugar-sweetened beverage and 100% juice (servings/day)	0.81 (0.16)	0.43 (0.13)	.07
Physical activity moderate/vigorous (mins/day)	46.6 (4.8)	48.2 (3.9)	.79
Sedentary (mins/day)	792.3 (43.5)	821.0 (34.9)	.61

Note. Means (standard errors) are adjusted for baseline value.