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## Food-Focused Media Literacy for Remotely Acculturating Adolescents and Mothers: A Randomized Controlled Trial of the “JUS Media? Programme”

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### ABSTRACT

**Purpose:** Unhealthy eating is a major modifiable risk factor for noncommunicable diseases and obesity, and remote acculturation to U.S. culture is a recently identified cultural determinant of unhealthy eating among adolescents and families in low/middle-income countries. This small-scale randomized controlled trial evaluated the efficacy of the “JUS Media? Programme,” a food-focused media literacy intervention promoting healthier eating among remotely acculturating adolescents and mothers in Jamaica.

**Methods:** Gender-stratified randomization of 184 eligible early adolescents and mothers in Kingston, Jamaica (i.e., 92 dyads:  $M_{\text{adolescent.age}} = 12.79$  years, 51% girls) determined 31 “Workshops-Only” dyads, 30 “Workshops + SMS/texting” dyads, and 31 “No-Intervention-Control” dyads. Nutrition knowledge (food group knowledge), nutrition attitudes (stage of nutritional change), and nutrition behavior (24-hour recall) were primary outcomes assessed at four time points (T1/baseline, T2, T3, T4) across 5 months using repeated measures analysis of covariances.

**Results:** Compared to control, families in one or both intervention groups demonstrated significantly higher nutrition knowledge (T3 adolescents, T4 mothers: mean differences .79–1.08 on a 0–6 scale, 95% confidence interval [CI] .12–1.95, Cohen’s  $d_s = .438$ –.630); were more prepared to eat fruit daily (T3 adolescents and mothers: .36–.41 on a 1–5 scale, 95% CI .02–.77,  $d_s = .431$

**Authors’ Note:** The JUS Media? Programme Study Team members spanned The University of the West Indies Open Campus (Tashaine Morrison, Candice Wray, Arianne Anderson, Jodi Sutherland, Patricia Butler, Gabrielle Nelson-Cameron, Shanique Clarke, Rochelle Bryson, Jolene Morgan, Esther Mighty) and the University of Illinois at Urbana-Champaign (Kat Tian and Tyler Wolpert). Data were collected when Gail M. Ferguson and Cagla Giray were at Department of Human Development and Family Studies, University of Illinois at Urbana-Champaign.

**Disclaimer:** This transdisciplinary research was presented at the conferences of the Society for Research on Adolescence, the Society for Public Health Education,

### IMPLICATIONS AND CONTRIBUTION

This brief cost-effective transdisciplinary intervention, the JUS Media? Programme, promotes healthier eating among remotely acculturating adolescents and mothers internationally by teaching critical thinking skills about food advertising on U.S. cable television. This study demonstrates the efficacy of media literacy training to promote adolescent nutrition in a

the Jamaican National Health Research Conference, the International Society for the Study of Behavioral Development, the International Association of Cross-Cultural Psychology, the National Association for Media Literacy Education Conference, and the American Academy of Advertising.

**Conflicts of interest:** The authors have no conflicts of interest to disclose.

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–.493); and were eating more cooked vegetables (T4 adolescents and T2 and T4 mothers: .20–.26 on a 0–1 scale, 95% CI -.03–.50,  $d_s = .406-.607$ ). Postintervention focus groups (6-month-delay) revealed major positive impacts on participants' health and lives more broadly.

**Conclusions:** A food-focused media literacy intervention for remotely acculturating adolescents and mothers can improve nutrition. Replication in Jamaica and extension to the Jamaican diaspora would be useful.

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low/middle income country.

Globalization has given rise to a new psychocultural determinant of health for youth and families, “remote acculturation”: internalizing a distant, non-native cultural identity and lifestyle [1]. *Remote acculturation* (RA) was first documented in Jamaica, where U.S.-identified youth and mothers watch more hours of U.S. cable daily, including embedded junk food advertising, and, in turn, eat more unhealthy food compared to their culturally traditional peers [2]. However, recent research shows that high media literacy—being more critical of the content and intent of food advertising—can weaken/nullify this RA-unhealthy eating association [3]. A transdisciplinary food-focused media literacy intervention, blending acculturation psychology, media/advertising, and nutrition sciences—the “*J(amaican and) U(nited) S(tates) Media? Programme*”—was developed to promote healthier eating among U.S.-identified Jamaican adolescents and mothers by improving their critical thinking skills about food advertising [4]. This study evaluated the efficacy of this intervention using a small-scale randomized controlled trial (RCT). Jamaican views of U.S. culture derive mainly from mainstream European American norms observed through media [5]; therefore, our use of “U.S.” henceforth refers to European American.

Obesity has multilevel “cell-to-society” predictors [6] and the obesity epidemic is exacerbated by economic vulnerabilities in low/middle-income countries [7]. The nutrition transition from traditional whole foods to highly processed and energy-dense convenience foods is a major contributor to rising obesity rates in these countries [8]. Rising incomes and lowered food prices have had the unintended effect that many global families now have disposable income to purchase U.S.-style junk food [9]. Companies have also turned intensive global marketing efforts to the Majority World [10].

Western media play a role in rising overweight and obesity among children and adolescents globally [8,11]. An international meta-analysis of 29 RCTs demonstrated that exposure to junk food advertising increases children's/adolescents' consumption of energy dense, low nutrition products [12]. Comprising one third of the global media/entertainment industry [13], the U.S. exports cable television, movies, music, games, and streaming services. The Caribbean region has experienced an explosion in access to fast food and U.S. media, including U.S. cable TV with advertising intact [14], and now has one of the world's highest adolescent mean body mass index scores [15]. Studies in Jamaica consistently show that food and beverage advertising is unavoidable and promotes largely unhealthy options, especially for children/adolescents and mothers [16,17].

RA of global youth toward U.S. culture puts them at higher risk of unhealthy eating [1,2,18]. A cross-sectional study of 330 adolescent-mother dyads in Kingston, Jamaica found that, controlling for socioeconomic status, adolescents and mothers who identified more strongly with U.S. culture and found U.S. media

more enjoyable, watched more U.S. cable television and ate more unhealthily [2]. Together with experimental research findings from advertising [12], this suggests a negative influence of U.S.-produced food advertising on their diets. Awareness of the manipulative intent of food advertising, part of media literacy, may disrupt the negative influence of media on adolescents' dietary habits [3] and health [19]; hence, the need for food-focused media literacy training among adolescents [20], who are a prime target for advertisers [21]. Multiple initiatives have promoted healthier food in Jamaica [22], but did not address RA or media literacy, which led to the development of the JUS Media? Programme [4].

The purpose of this study is to evaluate the efficacy of the JUS Media? Programme in Jamaica using an RCT with follow-up focus groups. To our knowledge, no prior RCTs have evaluated parent-adolescent food-focused media literacy workshops at post-intervention and after delay, nor has SMS been used, especially in a low/middle-income country. We expected participants who received the intervention workshops to have better nutrition knowledge, attitudes, and behavior and higher food-focused media literacy postintervention compared to the control group. We also expected participants receiving the workshops + SMS to benefit most. This intervention was designed to target adolescents (both genders) and mothers; therefore, no gender/generation differences were expected.

## Methods

### *The JUS media? Programme intervention*

The JUS Media? Programme involves transdisciplinary food-focused media literacy training for remotely acculturating adolescents and mothers. The question mark communicates the goal to teach individuals to question health and lifestyle messages embedded in food advertising. Mothers are included because they overwhelmingly manage family nutrition, and Jamaican research shows that their media and nutrition habits are linked to their adolescents' [2]. The JUS Media? Programme [4] originated from a major cultural and developmental adaptation of a validated food-focused media literacy intervention designed for U.S. schoolchildren [23], an approach also used successfully in family-based format [24]. The JUS Media? Programme—described in detail elsewhere [4]—includes two 90-minute face-to-face interactive workshops for adolescents and mothers, followed by 8 weeks of SMS/text messaging to reinforce workshop themes.

### *Setting and sample*

This RCT involved seventh graders and their mothers from three large, geographically, socioeconomically, and academically

diverse government-run high schools around Kingston, Jamaica (two single-sex, one co-educational). In Jamaica, after sitting a national sixth grade placement examination, seventh grade is the entry point into high school at 12 years old where students establish independent dietary habits. This contextual shift, along with major psychosocial, cognitive, and biological shifts around puberty, presents a window of opportunity for intervention. [Figure 1](#) outlines the design and timeline of this 5-month study.

Following Institutional Review Board approval from the U.S. institution (IRB# 17182) and collaborating Jamaican institution, approximately 800 seventh graders and their mothers were invited to be screened for eligibility. All seventh graders in attendance on screening days were given an envelope containing a parental consent form, adolescent assent form, and two 1-page screeners (student, mother). Altogether, 152 families opted into the study by returning all forms, consenting to group assignment to one of two intervention groups or no intervention ([Appendix A](#)). Dyads were excluded if: (1) mother/student had a mean score <2 and any of the three screening measures indicating “none or none at all” for *U.S. media enjoyment*, “1 hour or less per day” *watching U.S. TV*, and “none”/“one time every week” *consuming fast food/sugary drinks*; (2) mother/student was not born in Jamaica, (3) mother/student was not a Jamaican citizen, (4) mother/student was a U.S. citizen/dual citizen, (5) had not lived in Jamaica for the past 15 years (mother) or 8 years (student), (6) mother/student did not live together, or (7) mother had been primary guardian of the student for <5 years. Based on these criteria, 92 of those 152 screened dyads were selected for enrollment ( $M_{\text{adolescent.age}} = 12.79$ , standard deviation [SD] = .49;  $M_{\text{mother.age}} = 39.08$ , SD = 6.06; 51% girls). See [Appendix B](#) for more participant characteristics.

Single-blinded gender-stratified randomization of the 92 dyads was then performed by the U.S.-based principal investigator, who was not involved in recruitment/screening in Jamaica, by creating a randomization sequence using Excel 2016 with a 1:1:1 allocation. Dyads were placed into one of three “intent-to-treat” conditions: *Workshops-Only* (31 dyads), *Workshops + SMS* (30 dyads), and *No-Intervention-Control* (31 dyads). The actual “per-protocol” condition enrollments were: *Workshops-Only* (25 dyads), *Workshops + SMS* (25 dyads), and *No-Intervention-Control* (45 dyads) (per-protocol groups were based on intervention/control condition actually received; see [Appendix A](#) for explanation including intervention no-shows).

Six months after T4 (final data collection point) for the RCT, a subsample of families who received the intervention participated in three postintervention feedback focus groups ( $n = 16$  individuals;  $n_{\text{dyads}} = 3, 2, \text{three}$  respectively). Only Workshops +

SMS families were invited to participate in focus groups because they had experienced both the Workshops and SMS/texting components of the intervention (except for one Workshops-only family who was inadvertently added to the list of potentials making 26 eligible dyads total). Focus group interviews are ideal to gather in-depth feedback on participants’ program experiences [25] and can provide another index of the intervention effects. See [Appendix C](#) for more details.

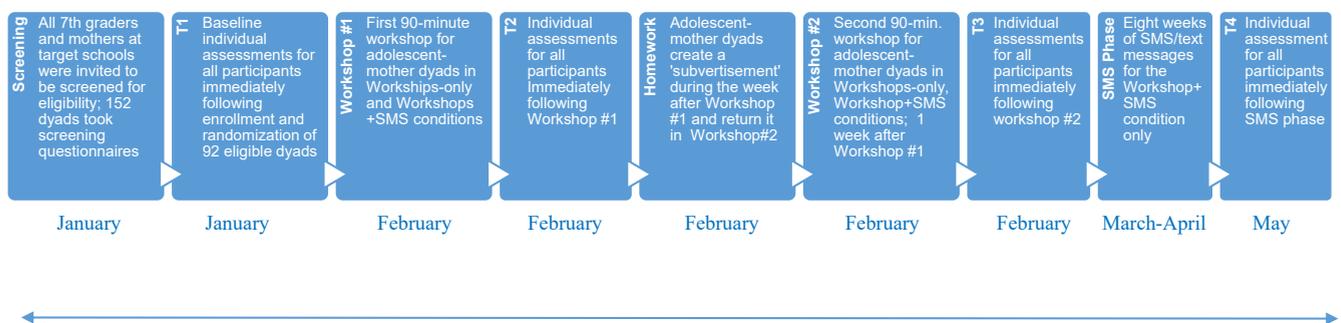
### Procedures

Adolescent-mother dyads in the Workshops-Only and Workshops + SMS conditions were pooled for workshops that covered the following: (1) national guidelines for a healthy balanced diet from the Jamaica Ministry of Health and Wellness (JMHW); (2) RA in Jamaica; (3) media literacy principles pertinent to food advertising such as how to critically analyze authors, audiences, messages/meanings, and representations/reality of ads [26]; and (4) “subvertising” (subvert + advertising: [27]), creating a parody of an existing ad. Each adolescent-mother dyad created a subvertisement over the next week and returned to Workshop #2 for a competition wherein participants voted for the best subvertisements. Winning families received certificates and small gifts. Dyads in the Workshops + SMS condition then received thirty 160-character SMS messages across 8 weeks reinforcing workshop content (responses not required). Fifteen of these messages paralleled workshop content to teach/remind the participant of a principle, then prompt toward a behavior. Interspersed were 15 companion messages delivering social feedback on responses to the prior content-driven SMS, which contained normative information [28]. Six months after the intervention, a subsample of dyads assented to participate in feedback focus groups.

Each participating adolescent and mother received pre-paid phone credit as incentives (approximately US\$1 for screener, US\$7 for each workshop and focus group) and several families received a small travel stipend to attend workshops.

### Measurement

This intervention aimed to improve nutrition and food-focused media literacy—the primary and secondary outcomes, respectively. Intervention effects were measured multidimensionally at T1–T4 with questionnaires and using post-intervention focus groups. Nutrition was measured by food group knowledge, attitudes (stage of change toward nutrition goal), and behavior (foods eaten in the last 24 hours). First,



**Figure 1.** Study design and timeline for small-scale RCT of the JUS Media? Programme occurring over 5 months. Individual assessments at T1, T2, T3, and T4 included a questionnaire and two telephone-mediated 24-hour food recalls.

**Table 1**  
Statistically significant mean comparisons from ANCOVAs comparing RCT conditions across study outcomes

Outcome	Scale range	Time point	Participant	Contrasted conditions	Intent-to-treat analyses			Per-protocol analyses			Figure		
					Mean difference	95% CI	Cohen's <i>d</i>	Mean difference	95% CI	Cohen's <i>d</i>			
Nutrition knowledge (food groups)	0–6	T3	Adolescents	W + S > C	1.08*	.20–1.95	.630	.88*	.01–1.77	.458	2		
			Mothers	W + S > C	.79*	.12–1.71	.608	.84+	–.08, 1.76	.510	2		
			Mothers	W > C	1.07+	.14–1.99	.438	.96*	.02–1.91	.552	2		
Stage of change toward healthier eating (fruits)	1–5	T3	Adolescents	Pooled W > C	.41*	.04–.77	.493	.34+	–.02, .70	.417	2		
			Mothers	Pooled W > C	.36*	.02–.75	.431	.44*	.07–.81	.452	2		
24-Hour recall of cooked vegetables	0–1	T2	Mothers	W > C	.26*	.05, .47	.607	.21+	.01–.43	.470	3		
			Mothers	W + S > C	.22*	.01–.43	.601	.23*	.02–.45	.519	3		
		T4	Adolescents	W > C	.25*	.01–.50	.528	.27*	.02–.52	.477	3		
			Adolescents	W + S > C	.22+	–.03–.48	.429	.30*	.05–.55	.500	3		
		T4	Mothers	W > C	.20+	–.03–.43	.406	.25*	.04–.50	.581	3		
			Mothers	W + S > C	.24*	.06–.47	.548	.26*	.02–.48	.642	3		
		Food-focused media literacy	1–4	T2	Adolescents	W > C	.24*	.03–.44	.580	.24*	.03–.45	.610	3
					Adolescents	W + S > C	.18+	.38–.38	.439	.18+	–.03, .38	.410	3
T3	Mothers			W > C	.11*	.01–.44	.536	.19+	–.04, .41	.528	3		
	Mothers			W + S > C	.11*	.04–.48	.620	.25*	.03–.47	.721	3		
T4	Mothers	W + S > W	.34*	.06–.62	.625	.25+	–.03, .53	.468	3				
	Mothers	W + S > C	.26*	.02–.54	.600	.39**	.11–.67	.800	3				

Note. Table displays statistically significant mean comparisons to correspond to the Results section text; see text for M/ANCOVA *F*-test statistics. Mean comparisons displayed here controlled for SES (household possessions).

ANCOVA = analysis of covariance; C = Control; CI = confidence interval; MANCOVA = multivariate analysis of covariance; Pooled W = Pooled Workshops; RCT = randomized controlled trial; W = Workshop; W + S = Workshop + SMS.

\*\**p* < .01 \**p* < .05 + *p* < .10.

knowledge of the JMHW national “Food Plate” dietary guidelines of Jamaica was measured [29]. Participants were asked to assign each of six food groups to the correct proportion within a blank food plate: responses were scored “1” (correct) or “0” (incorrect) and a sum score was calculated (range = 0–6). Second, a stage of change measure of healthy eating [30] was adapted to measure adherence to five JMHW food-based dietary guidelines (e.g., reducing sugary foods, eating a variety of food groups: 29). Participants used a six-point scale including the following: (1) precontemplation, (2) contemplation, (3) preparation; (4) action, and (5) maintenance stages [30]. For items discouraging eating certain foods, there was a sixth option for total abstinence. Third, using structured telephone interviews with open-ended responses, 24-hour food recalls were conducted for 1 weekday and 1 weekend day at T1–T4 using a modified brief multiple pass method. The 24-hour recall is the most widely used dietary intake measure and has proven valid and reliable in Jamaica [31]. Participant responses were recorded by trained interviewers and coded for the presence (1) or absence (0) of fruits, raw vegetables, cooked vegetables, and fats/oils. A sum of the number of sugary foods/beverages eaten across 7 categories was also computed (sample range = 0–9).

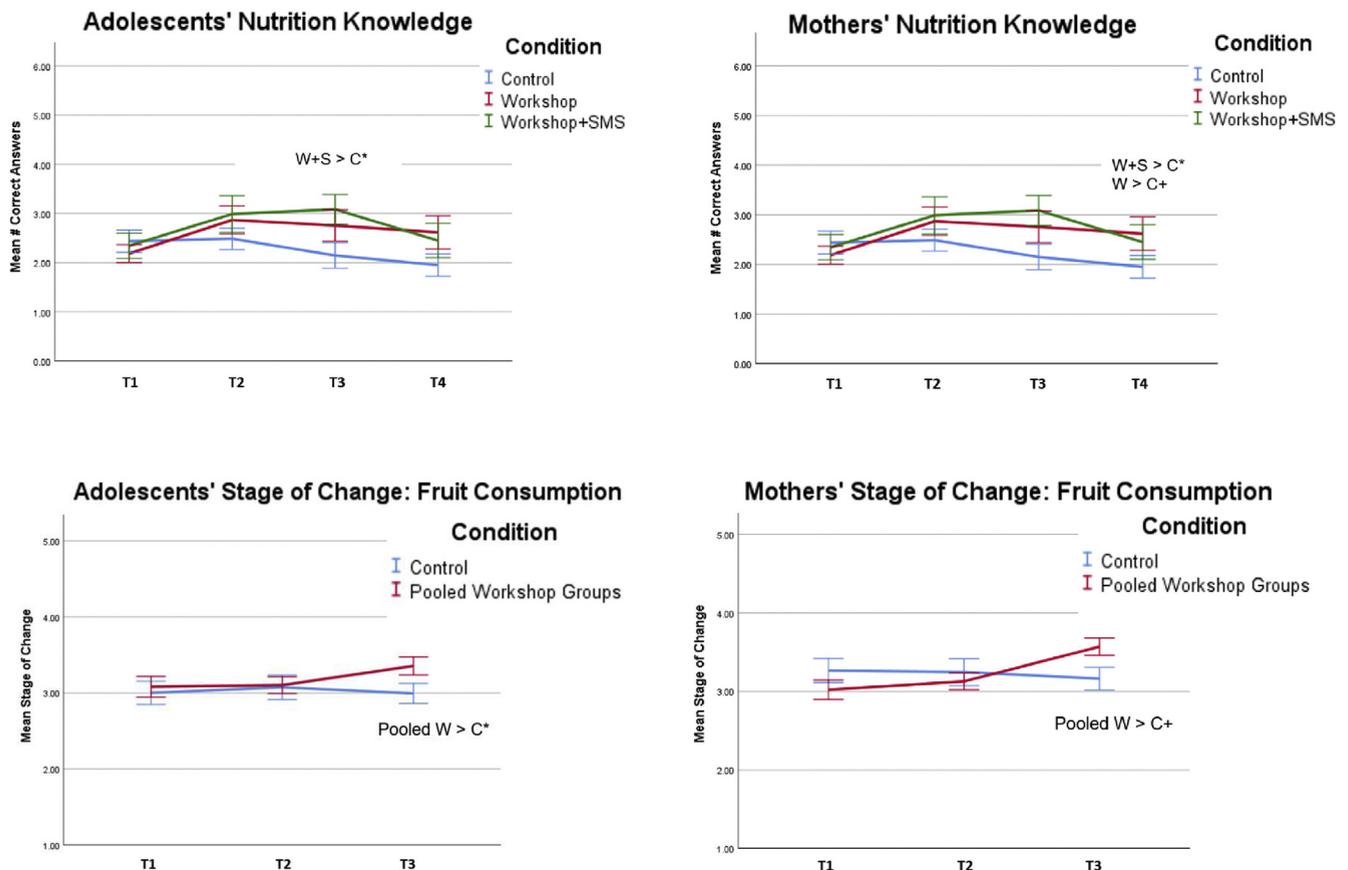
For the secondary outcome, food-focused media literacy was measured with a 14-item 4-point disagree-agree scale that assesses meanings, representation, and truth in advertising [24].

This measure was previously validated in Jamaica [3] and the scale mean was used ( $\alpha_{\text{adolescent}} = .75-.89$ ,  $\alpha_{\text{mother}} = .83-.92$ ).

For focus groups, three interviewers (Jamaican, Jamaican American, American) posed interview questions with clarifying probes. Questions covered the following: (1) participants’ general experiences in the JUS Media? Programme and its perceived impact on their nutrition and their lives; (2) perceived strengths and weaknesses of the intervention; and (3) SMS effectiveness. See Appendix C for more details.

#### Data analyses

Persistent attempts (calls/texts) were made to follow and retain all participants across the study [32]. The amount of missing data for youth at T1 was 24%, 30% at T2 and T3, and 16% at T4. For mothers, there was 20% missing data at T1, 32% at T2, 31% at T3, and 16% at T4. Little’s missing completely at random test was conducted for youth and mother data at each time point, confirming by non-significance that these values were missing at random. For youth, results at T1–T4 were, respectively:  $X^2(2,925) = 148.32$ ,  $X^2(3,099) = 34.35$ ,  $X^2(2,607) = 1,731.64$ , and  $X^2(2,911) = 310.12$ , all  $ps > .05$ . Mothers’ values were similar:  $X^2(2,463) = 1,729.56$ ,  $X^2(3,869) = 1,481.54$ ,  $X^2(3,657) = 2,223.56$ , and  $X^2(3,298) = 139.44$ , all  $ps > .05$ . Therefore, multiple imputation specifying



**Figure 2.** Changes in adolescents’ and mothers’ nutrition knowledge (top) and stage of change in fruit consumption (bottom) by condition. C = Control (blue); W = Workshop (red); Pooled W = Pooled Workshops (red); W + S = Workshop + SMS (green). \* $p < .05$  +  $p < .10$ .

five imputations was done, and imputed values were aggregated across the five new datasets before data analyses. Three dyads were lost to follow-up (Appendix A) and those missing values were imputed as described. Based on RCT recommendations [33,34], per-protocol (PP) analyses were performed in addition to intent-to-treat (ITT) to most accurately estimate the actual difference between conditions, which can be underestimated by ITT analyses. PP analyses showed very similar results to ITT analyses; therefore, ITT analyses are reported in the text whereas ITT and PP results are displayed in Table 1. In one case (24-hour Food Recall), both ITT and PP analyses are reported in the text because only the PP multivariate analysis of covariance (MANCOVA) reached the threshold for statistical significance; however, the ITT and PP means comparisons and effect sizes are virtually identical (Table 1). Sensitivity analyses [32] showed identical results using an alternate dataset (Appendix B). An alpha level of .05 was used although “marginal significance” ( $<.10$ ) is also noted.

Using SPSS 25 for quantitative data, mixed repeated-measures MANCOVAs and ANCOVAs were conducted with two within-subject factors (Time  $\times$  4, Person  $\times$  2) and one between-subjects factor (Condition  $\times$  3) controlling for SES (Household possessions) to examine the intervention effects on nutrition and media literacy. Whenever the sphericity assumption was violated, the Greenhouse-Geisser test was used [35]. A priori power calculations based on mean changes in media/advertising literacy from previous research [23] confirmed that the sample size would provide adequate to

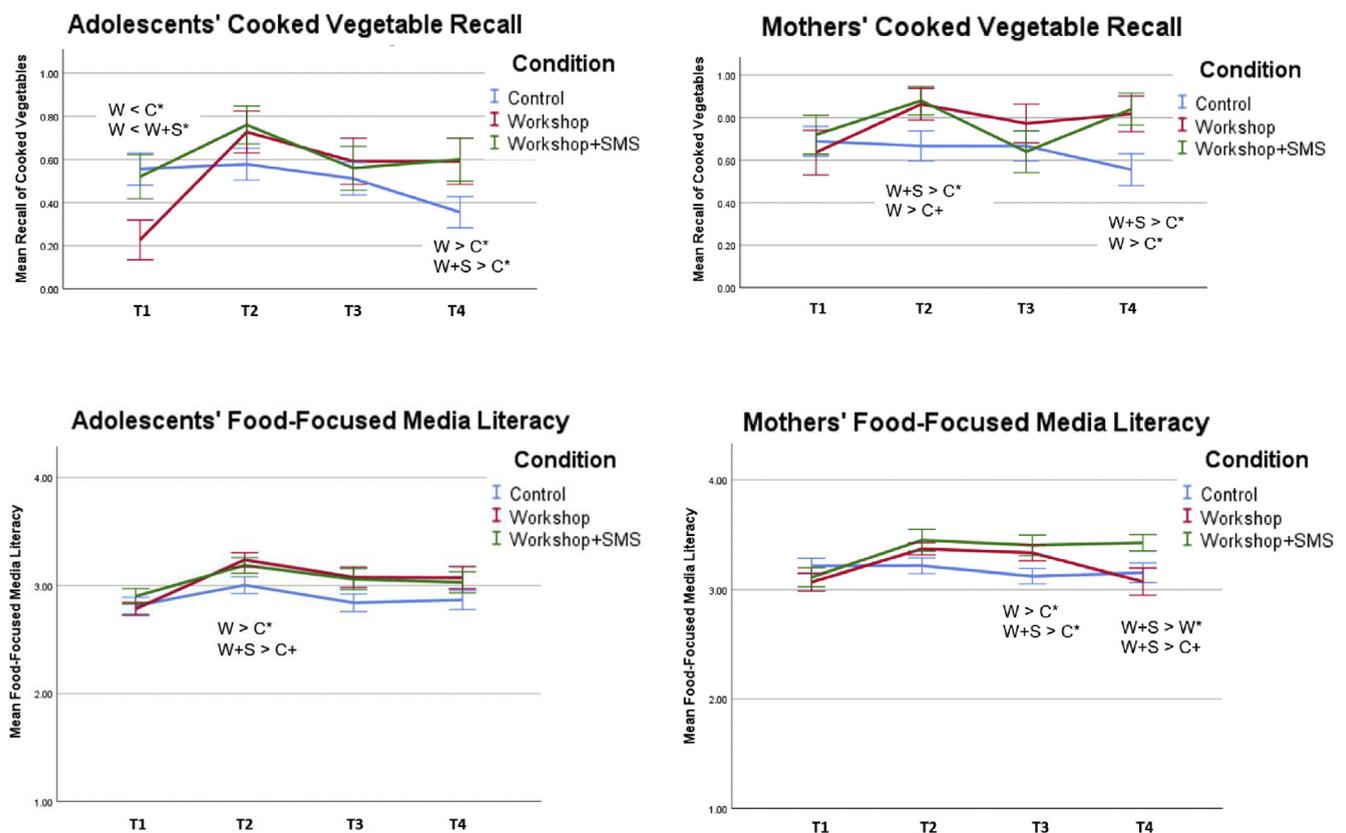
robust statistical power ( $\geq .80$ ) to detect small effects for the central Time  $\times$  Condition interaction. Within-group change over time was not the focus of these analyses because of expected placebo effects across conditions; rather, group differences in change over time were the focus. Thematic analyses [36] were used to analyze the focus group data and coding was performed by two project staff present in the focus groups (Jamaican, Jamaican American).

## Results

Appendix D displays the T1 means, standard deviations, and intercorrelations among major study variables. Generally, at T1 both adolescents and mothers had moderate nutrition and media literacy scores. SES was significantly correlated with adolescents' fruit consumption ( $r = -.22, p < .05$ ) and mothers' nutrition knowledge ( $r = .22, p < .05$ ) at T1. Therefore, SES was covaried in the main analyses. There were no significant group differences at T1, except in one instance where the Workshop group had lower cooked vegetable consumption than control (pattern reversed by T4 in line with hypotheses). Table 1 displays mean comparisons across conditions for all outcomes analyzed.

### Nutrition knowledge: food groups

There were no significant main effects of Condition on Nutrition Knowledge in the ANCOVA but, as hypothesized, there was a significant Time  $\times$  Condition interaction,  $F(6,264) = 2.432$ ,



**Figure 3.** Changes in adolescents' and mothers' recall of cooked vegetables consumed in the last 24 hours (top) and food-focused media literacy (bottom) by condition. C = Control (blue); W = Workshop (red); W + S = Workshop + SMS (green). \* $p < .05$  +  $p < .10$ .

**Table 2**  
Themes and codes from post-intervention feedback focus groups discussing the JUS Media? Programme

	Themes	Codes	Illustrative quotes <sup>a</sup>	
Impact of intervention	Increased healthy eating	Eat more fruits and vegetables	<ul style="list-style-type: none"> <li>• 562M: “I try to eat fruit every day”</li> <li>• 697Y: “After di program, like my mom was literally feeding me on fruits and vegetables”</li> <li>• 217Y: “I started drinking more water and eating more healthier”</li> <li>• 750M: “...more water and less juice...”</li> <li>• 167Y: “And for me and my friends now, we normally buy a two-piece, which is two piece a chicken and fries. So now we stop, we cut it out. So is like once a week we have fries...We have like rice and peas more”</li> </ul>	
		Drink more water Buy healthier lunches Consume less sugar-sweetened beverage	<ul style="list-style-type: none"> <li>• 750Y: “Stop drinking soda”</li> <li>• 750M: “Even the tea, I'm now, I'm now using less sugar”</li> <li>• 005Y: ‘I would buy it after I look at the label. If if it has too much salt or sugar I would not buy it’</li> <li>• 498Y: “Like if my friend say ‘here, have a pizza’ I doe take it...I have not eaten KFC in a long time...pizza long time”</li> </ul>	
	Decreased unhealthy eating	Reduce unhealthy lunch purchases	<ul style="list-style-type: none"> <li>• 562M: “I'm a person weh love junk food and I kinda cut it down”</li> <li>• 750M: “Since [JUS Media?] I have cut down on meat in a lot of meals, bringing in more vegetables, bringing in more fruits, less juice...”</li> <li>• 005Y: “I still go to KFC but not regular. Once...a month I go to KFC but not regular”</li> <li>• 792M: “You can drink juice you know, depends on how much sugar you put inna it...”</li> </ul>	
		Eat less junk food Eat multiple food groups	<ul style="list-style-type: none"> <li>• 750M: “Well he would...definitely [be] waiting for it to be over {laughs}. The older girl now would have this discussion about it. And the ‘but Mommy’ part weh you haffi deal wid. Because you know they do not want to stop certain things. And you’d be saying to them ‘you need to incorporate more of this’ or whateva”</li> <li>• 750Y: “I tell her the foods she not supposed to eat”</li> <li>• 167M: “And even recently 167Y mentioned it again amm it was about a week and a half ago. She said ‘Mommy, what did we do again?’ And she kinda went through the process of how we changed the advertisement to the subvertisement”</li> </ul>	
	Balanced diet	Use moderation	<ul style="list-style-type: none"> <li>• 498M: “greater bonding with 498Y...so you find that because you’re coming to this [program] we have a common thing to have conversation because normally you know parents and kids you nuh...they’re they’re in their own little world’</li> <li>• 697M: “Me talk bout it at work”</li> <li>• 498M: “I tell my sister, my mother, my parents, everybody”</li> <li>• 005Y: “My classmate...Cuz I normally drink like two bottles bottles of juice and she saw me drinking water one day and she was like being all extra and everything like ‘005Y, yuh drinking water! Oh mah God!’”</li> <li>• 167Y: “I have a friend like every lunch time if you do not see [him] with a cookie or a muffin or a donut something wrong...So we were telling him ‘oh, you need to eat more fruits”</li> <li>• 217Y: “Well before, I had acid reflux...So before I could not really eat the greasy stuff and the acid. But...I’d still eat it...because I could not stop. And then from I started coming to JUS Media? Programme I realized that it was not kinda helping me...so I started drinking more water and eating more healthier...I get less attacks cuz it hurts my throat sometimes. And it does I do not really feel that tired {inaudible}”</li> </ul>	
		Catalyzed parent-adolescent communication	Discuss healthy eating	
	Indirect impacts on others	Discuss unhealthy eating		
		Discuss media literacy		
		Discuss shared activities		
		Tell others		
Indirect impacts on others	Others observe my change			
	Encourage others to eat healthily			
	Less acid reflux			

(continued on next page)

**Table 2**  
Continued

	Themes	Codes	Illustrative quotes <sup>a</sup>
Behavior change	Improved physical health and fitness	More energy and stamina	<ul style="list-style-type: none"> <li>792M: “A since of lately me start drink wata an it mek mi body feel light. ... Becaw me tell yuh [before JUS Media?] if me walk go dere suh me tiad...me whole body jus tayad.” [Because, I tell you, before JUS Media? if I walked over there, I would feel tired, my whole body would just feel tired.]</li> </ul>
		Better athletic performance	<ul style="list-style-type: none"> <li>792Y: “When I used to drink soda an I go on the track, Miss. I could not run a 400 meter good. I would normally jog from 300 meter. An suh from I drinkin’ wata I started to run a 800 meter!”</li> </ul>
		Heightened awareness	<ul style="list-style-type: none"> <li>498M: “Made me more conscious...because I now look more at what I’m eating...and even more what the kids are eating and everybody around me...So it created a greater awareness so, you know, I started food-watching”</li> </ul>
		Critical thinking	<ul style="list-style-type: none"> <li>167Y: “So like when I’m eating I had second thoughts about what I’m eating. Had to think about how much soda or how much calories I eat and you know you have to eat different kinds so I pick up a fruit or something. So it kinda registered in my head. Like no you cannot eat that because it would damage...which organ in your body”</li> </ul>
	Process of change	Recollections and reflections	<ul style="list-style-type: none"> <li>217M: “Honestly at first I was’n, I was not following the diet they say ‘oh, what you had this morning for breakfast?’...But I mean when I look back at the sheet and see the balanced meal I said ‘no I can follow through’. And honestly now, I’m not drinking the whole lotta juice anymore. The salty stuff I’m not eating it”</li> </ul>
		Parental reinforcement	<ul style="list-style-type: none"> <li>005M: “Telling her what not to eat...when I see her coming in with some of the tings dem I would get on her”</li> </ul>
		Rapid/major change	<ul style="list-style-type: none"> <li>498Y: “So then I say ‘you know what? I’m going on a diet’. And I went on it”</li> </ul>
		Gradual/partial change	<ul style="list-style-type: none"> <li>750M: “I’m trying. We will get there”</li> </ul>
		Food plate chart	<ul style="list-style-type: none"> <li>498M: “Even to this day the charts that I got at the workshop with the food groups I still have it at home on my fridge”</li> </ul>
		Medical condition	<ul style="list-style-type: none"> <li>498Y: “I went to a doctor and...I went on the scale and when I look my weight was like off the charts and I’m like ‘Mommy, this scale is wrong, that cannot be me”</li> </ul>
		Accessibility of healthy food options	<ul style="list-style-type: none"> <li>005M: “I was battling with ahm blood pressure”</li> <li>792M: “like all me weh work down town, we cya ‘av no excuse caw the fruit is there right there in our eyes even” [For me, I work downtown, we cannot have any excuses because the fruit is right there before our eyes]</li> </ul>
		Awareness of health risks of junk food	<ul style="list-style-type: none"> <li>792Y: “Caw it [soda] bad fi yuh. [Because it’s bad for you.]”</li> </ul>
		Program dare/challenge	<ul style="list-style-type: none"> <li>697Y: “Sherlock Holmes challenge, like true, cause he’s a detective...He said so how many healthy foods did you spot today?”</li> </ul>
		Barriers to change	Bad habits
Lack of healthy food options	<ul style="list-style-type: none"> <li>697Y: “But I did not find any. Didn’t find any.” Interviewer: “Oh you did not find any healthy foods?” 697Y: “No, Miss” Interviewer: “Where were you that day, at school?” 697Y: “Yes, Miss”</li> </ul>		
Practical constraints	<ul style="list-style-type: none"> <li>167M: “But how do you on an average budget eat healthy?...I have this in my cupboard I’m going to make dinner...how do I make a healthy meal from this? ... And sometime you buy the tangerine now it only lasts a week and I do not have time to go back to the market to buy another dozen...how do we make it work?”</li> </ul>		

<sup>a</sup> Each participant’s illustrative quote is preceded by a dyad ID containing a “Y” or “M” to indicate whether it was the Youth or Mother speaking, respectively.

$p = .026$ ,  $\eta_p^2 = .052$ , further qualified by a marginally significant Time  $\times$  Condition  $\times$  Person interaction,  $F(6,264) = 1.964$ ,  $p = .071$ ,  $\eta_p^2 = .043$ . Follow-up ANCOVAs revealed mean differences across conditions at T3 for adolescents,  $F(2,88) = 2.998$ ,  $p = .055$ ,  $\eta_p^2 = .064$ , and at T4 for mothers,  $F(2,88) = 2.879$ ,  $p = .061$ ,  $\eta_p^2 = .061$ . Per means comparisons, adolescents in the Workshops + SMS group had significantly higher Nutrition Knowledge at T3 compared to those in the Control group and mothers in the Workshops + SMS group and Workshops-only group had higher Nutrition Knowledge than those in the Control group at T4 (Table 1, Figure 2-top).

#### Nutrition attitudes: stage of change toward healthy eating

Initial MANCOVA results showed no significant main effects or interactions of Condition on participants' Stage of Change Toward Healthy Eating. However, to further investigate the a priori hypotheses, the two intervention conditions were pooled to increase analytic power given that both intervention conditions had identical experiences from T1 to T3. Therefore, the MANCOVA was rerun with T1–T3 pooled workshop data only. As expected, the multivariate effects and univariate analyses showed no significant main effects, but there was a significant Time  $\times$  Condition interaction for Fruit Consumption,  $F(2,178) = 4.600$ ,  $p = .011$ ,  $\eta_p^2 = .049$ . Follow-up ANCOVAs for adolescents revealed significant differences across conditions at T3,  $F(1,89) = 4.796$ ,  $p = .031$ ,  $\eta_p^2 = .05$ : relative to those in the Control group, adolescents in the pooled Workshops condition were further along in the preparation stage and closer to the action stage of change toward recommended daily fruit consumption. There was a similar finding for mothers, albeit a marginal effect,  $F(1,89) = 3.563$ ,  $p = .062$ ,  $\eta_p^2 = .038$  (Table 1, Figure 2- bottom).

#### Nutrition behavior: 24-hour recall

There were no significant main effects or interactions on 24-hour Food Recall in ITT MANCOVA analyses: Wilks Lambda = .652,  $F(30,148) = 1.176$ ,  $p = .260$ ,  $\eta_p^2 = .193$  for the central Time  $\times$  Condition interaction. However, PP analyses showed no significant main effects but, as hypothesized, there was a significant multivariate Time  $\times$  Condition interaction, Wilks Lambda = .572,  $F(30,148) = 1.588$ ,  $p = .038$ ,  $\eta_p^2 = .244$ . Univariate analyses showed this 2-way interaction was significant for Cooked Vegetable recall,  $F(5,244) = 3.478$ ,  $p = .003$ ,  $\eta_p^2 = .073$ . First, follow-up ANCOVAs for adolescents at T1 revealed a main effect that Workshop adolescents ate fewer cooked vegetables than did those in other conditions ( $F(2,88) = 3.391$ ,  $p = .038$ ,  $\eta_p^2 = .072$ ). However, this pattern reversed by T4 ( $F(2,88) = 3.700$ ,  $p = .029$ ,  $\eta_p^2 = .078$ ; Figure 3): adolescents in the Workshops + SMS and Workshops-only groups ate more cooked vegetables than those in the Control group. Practically, only one in three control group adolescents recalled eating cooked vegetables at T4 compared to nearly two in three intervention adolescents. Mothers' ANCOVA findings were identical at T2 ( $F(2,88) = 3.139$ ,  $p = .048$ ,  $\eta_p^2 = .067$ ) and T4 ( $F(2,88) = 3.582$ ,  $p = .032$ ,  $\eta_p^2 = .075$ : Table 1, Figure 3- top). Only 55% of control mothers recalled eating cooked vegetables at T4 compared with over 80% of intervention mothers. There were also significant main effects of person on adolescents' Sugary Foods and Beverages in the multivariate and univariate analyses, Wilks Lambda = .890,  $F(5,84) = 2.076$ ,  $p = .076$ ,  $\eta_p^2 = .110$ ,  $F(1,88) = 5.094$ ,  $p = .026$ ,

$\eta_p^2 = .055$ , whereby adolescents consumed more sugary foods and drinks overall compared to their mothers.

#### Food-focused media literacy

There were no significant ANCOVA main effects on Food-Focused Media Literacy, but as hypothesized, there was a significant Time  $\times$  Condition interaction ( $F(4.81, 211.73) = 3.616$ ,  $p = .004$ ,  $\eta_p^2 = .076$ ). Follow-up ANCOVAs revealed differences across conditions at T2 for adolescents,  $F(2,88) = 2.889$ ,  $p = .061$ ,  $\eta_p^2 = .062$ , and differences at T3 and T4 for mothers,  $F(2,88) = 3.339$ ,  $p = .040$ ,  $\eta_p^2 = .071$  and  $F(2,88) = 3.101$ ,  $p = .050$ ,  $\eta_p^2 = .066$ , respectively. Specifically, adolescents in the Workshops-only and the Workshops + SMS groups had higher media literacy at T2 than those in the Control group and mothers showed near identical effects at T3 with higher scores in the Workshops-only and Workshops + SMS groups relative to the Control group. At T4, Workshops + SMS mothers had higher media literacy scores than Workshops-only and Control mothers (Table 1, Figure 3-bottom).

#### Focus groups

Thematic analyses revealed six themes regarding perceived impacts of the intervention: increased healthy eating, decreased unhealthy eating, balanced diet, catalyzed parent-adolescent communication, indirect impacts on others, and improved physical health and fitness. Additionally, there were three themes regarding perceived behavior change: process of change, facilitators of change, and barriers to change. See Table 2 for these themes, codes, and illustrative quotes.

Beyond these themes, focus groups also revealed that participants found the workshop enjoyable (i.e., "nice," "fun," "interesting," "helpful") and they were fond of the visuals (e.g., Food Plate, video clips of ads) and the subvertising component (e.g., ad spoofing, contest). Participants also felt proud of their accomplishments and the future preventive value of their learning (e.g., 217M "Saves you money from going to the doctor because when you get obese and everything"). Finally, focus group feedback suggested that the SMS supplement was of appropriate length (i.e., 8 weeks) and that several factors facilitated SMS responsiveness including use of local dialect and appropriate frequency and timing of SMS, and a consistent morning send-time for SMS. Barriers were also reported including technical issues and human error.

#### Discussion

RA to U.S. culture has only recently been recognized as a psychocultural determinant of health [2]. RA puts some global youth and parents at higher health risk because their strong affinity for U.S. media exposes them to more junk food advertising, which is associated with eating less healthy foods [2]. Teaching food-focused media literacy skills is an underexploited strategy to support healthy eating choices globally in the face of pervasive junk food advertising especially in U.S. media [3,4]. The current study evaluated the efficacy of the JUS Media? Programme—a transdisciplinary food-focused media literacy intervention designed for remotely acculturating families—among adolescents and mothers in Jamaica using a small-scale RCT. Findings showed support for the efficacy of this brief intervention with small to medium effects ( $\eta_p^2 = .03-.07$ ;  $d = .43-.63$ ) with

extended gains via SMS follow-up. Relative to control, families in one or both intervention groups—Workshops-only and Workshops + SMS—were eating significantly more cooked vegetables after the intervention (nearly twice as many intervention participants vs. control were eating cooked vegetables at study endpoint), were at a more advanced stage of change regarding increasing daily fruit consumption, demonstrated greater nutrition knowledge, and showed better critical thinking about food advertising.

These findings indicate the health promoting effect of JUS Media?—the intervention was efficacious in *increasing* vegetable and fruit consumption plans and actions but not in reducing dietary sugar or fat in our analyses. However, in postintervention focus groups, participants did report reducing both sugar and fat along with several other positive changes (e.g., swapping water for soda, less fried food; Table 2). This quantitative/qualitative discrepancy is likely because the 24-hour recall measurement focused on food presence/absence versus quantity (i.e., sugar/fat is the ingredient in many more foods than fruits). The loss of sensitivity was a necessary methodological compromise in favor of the higher feasibility of phone versus in-person assessment, and higher validity of 24-hours recall over other tools.

Postintervention focus groups clearly demonstrated that the statistical significance translated into large practical significance (Table 2). Major positive impacts of JUS Media? on participants' daily lives included healthier food choices at home and at school, developing a habit of critical thinking about food and advertising, improved medical conditions, enhanced physical fitness and performance, and even better parent-adolescent communication. Not only did both adolescents and mothers show positive changes in nutrition and food-focused media literacy post-intervention, but they also reported positive changes in their parent-adolescent communication and bonding in focus groups. Therefore, according to Masten's (2015) categorization of resilience-promoting interventions [37], the JUS Media? Programme had dual effects: *boosting* media literacy as a protective resource for adolescents and mothers as individuals, and *bolstering* the parent-adolescent relationship to mobilize the power of this adaptive system in the face of globalization-related stressors. Socially desirable responding does not account for these remarkable positive impacts reported because participants were also candid in voicing their initial skepticism and giving constructive feedback about the intervention.

Several aspects of the JUS Media? Programme likely contributed to its efficacy. First, targeting early adolescents enabled the intervention to capitalize on this window of opportunity during rapid development, and the program was tailored to adolescents' developmental characteristics including increased autonomy-seeking and the rise in abstract and critical thinking abilities [4]. The intervention was well-timed at the transition into high school (seventh grade) when adolescents are establishing new dietary habits that will serve them for several years. The inclusion of mothers likely also contributed to intervention efficacy because mothers are major drivers of nutrition in the home and they continue to matter for positive adolescent development and well-being [4]. Finally, the cultural and contextual tailoring of the intervention to Jamaican families contributed to its acceptability and efficacy as did the societal timing given the current national/regional efforts to address obesity [22].

We acknowledge some study limitations. First, although all seventh graders at the diverse schools participating were invited, participants self-selected into the study. However,

randomization ensured that the intervention effects were not due to higher motivation of the treatment groups. The 24-hour recall MANCOVA findings were only statistically significant in PP analyses although both ITT and PP means comparisons found statistically significant postintervention differences between the control group and both intervention groups for adolescents and their mothers. A modest sample size was planned to adequately power the detection of small effects in a priori efficacy analyses, but the study would have been underpowered to conclusively test mechanisms including media literacy as a mediator of intervention effects. Future studies can assess longer term maintenance of gains, the degree to which JUS Media? may motivate better alignment between one's food choices and one's values (e.g., adolescent autonomy: [38]), and decrease attentional biases to junk food [39].

## Conclusion

To our knowledge, this study is the first RCT to demonstrate that brief food-focused media literacy training can improve adolescent and family nutrition in a low/middle-income country, and that RA can be used to better target health interventions. Study results can guide the Jamaican government and supranational organizations (e.g., World Bank) in designing and implementing cost-effective/time-effective policies in culturally and contextually appropriate ways [3]. With minor cultural adaptations the JUS Media? Programme may be extended to Jamaican immigrant families in the U.S. and elsewhere, as well as to other acculturating groups. This approach can be applied to food marketing from any cultural source, not only U.S.-produced and can be easily leveraged to combat other unwanted foreign media messages impacting adolescent health habits such as smoking [40].

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## Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jadohealth.2021.06.006>.

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