

INTRODUCTION

Although amenable to change, habits and food preferences formed during childhood typically track into adulthood.¹⁻³ Hence, it is important to utilize strategies directed at elementary-aged children that influence targeted food and beverage choices known to impact health, such as increasing intake of fruits, vegetables and low-fat dairy foods as well as decreasing intake of sugar-sweetened beverages.⁴ Successful nutrition education aimed at children cannot simply be didactic but should be interactive, enjoyable and developmentally appropriate.⁵⁻⁷ Moreover, programming should have a theoretical framework⁵⁻⁷ such as those used in behavior change, education and social marketing.⁸ Finally, unique evaluation processes must be considered because children are mastering written language and inexperienced with surveys.

No matter how well theorized a child nutrition program might be, it must compete with the mass media environment that successfully uses a variety of strategies to impact food intake in children.⁹ Marketing strategies such as repetition, music, characters and excitement are well-thought-out, well-funded and incorporate theoretical frameworks.¹⁰ Nutrition educators can adopt and adapt marketing strategies to enhance both interventions and evaluation processes.

Use of entertainment as an educational tool, termed *edutainment*,¹¹ is a science with established guidelines.¹² In brief, research-based messages are woven into the audiences' lived experiences¹³ with compelling plots, songs and characters. To be effective, edutainment messages should be sustained as part of a comprehensive campaign that connects learners to characters and stories showing behavior change while establishing a new social norm. Edutainment has been a

successful component of previous nutrition interventions, improving knowledge, attitude and intention¹⁴⁻¹⁶ and developing resistance to persuasive messages.¹⁷ *Gamification*, another recent education strategy, incorporates gaming concepts into the learning process.¹⁸ Because health skills develop through practice, the positive experiences derived from learning through play help develop deep intrinsic motivations that positively influence health outcomes⁷ and lead to high levels of program satisfaction among participants.¹³

Although schools are an obvious venue for educating children about healthy eating,^{5,19,20} many students receive inadequate education despite its success.²¹ Although teachers consider nutrition education valuable for students,²² Common Core State Standards and high-stakes standardized testing make nutrition and physical education expendable.²³ Limited resources²² and lack of subject expertise make external/supplemental nutrition education programs attractive.⁵ Employing media strategies can entice classroom teachers into including nutrition education, thereby overriding cost and time barriers.¹⁷

Furthermore, nutrition educators often are required to evaluate their interventions. Assessment strategies for children are generally informal (using some type of written format) and focus on measuring changes in knowledge, attitude and behavior. Such changes are especially difficult to assess in young children given their cognition levels.²⁴ Moreover, with required standardized testing in elementary schools, questions have arisen regarding student stress in relation to any testing,^{23, 25} generating interest in investigating alternative evaluation strategies.

Employing media strategies, *Jump with Jill (JWJ)* is a music-based program that transforms nutrition education into a school-wide rock concert. *JWJ* creates an unforgettable experience

using original music, lighting, props and live characters to inspire their audiences for better nutrition (Figure 1). During the 60-minute show, students dance and sing to behaviorally-focus songs that address increasing consumption of fruits, vegetables, low-fat milk products and water. Following the concert, these characters and their messages are used by classroom teachers via follow-up materials (music downloads, activity sheets, danceable music videos, etc.).

[FIGURE 1: THE MUSIC-BASED NUTRITION EDUCATION SHOW, JUMP WITH JILL (JWJ), IN ACTION]

This study was undertaken to determine the feasibility of incorporating media strategies (e.g. edutainment and gamification) into a nutrition education campaign. The hypotheses were that incorporation of media strategies would (1) change student knowledge and intentions; (2) stimulate enthusiasm towards nutrition education; and (3) enhance the evaluation process.

METHODS

Recruitment

After receiving project funding, the author worked with an independent booking agency to recruit schools for the 2015-2016 school year to receive *JWJ* at no cost. Eligible schools (n=50) were within the 10 New Jersey counties that ranked lowest in the 2014 County Health Rankings (Atlantic, Camden, Cape May, Cumberland, Essex, Gloucester, Hudson, Passaic, Salem, and Union). One performance school per county was randomly chosen for testing. While the show was available to the entire school, only one randomly-selected 3rd grade class completed the deidentified pre- and post-surveys. Parental, student and teacher permission for participation was handled at the district level. All schools viewed *JWJ* as an adjunct to their education while

conducting the evaluation as part of normal practice by providing researchers with deidentified data; the XXX's Institutional Review Board approved this study. No demographic information was collected.

Survey Development

To match the delivery method of the intervention, a survey was designed incorporating edutainment and gamification strategies to assess knowledge, attitudes and intentions. For the first question about drink preferences, actual products (milk, water, energy drinks, fruit drinks and soda) were displayed. Milk and Water were classified as a positive response (coded as 1) and Energy Drink/Fruit Drink/Soda (coded as 0) were classified as a negative response (Figure 2).

For questions two through seven, instead of adapting more traditional 'yummy/yucky faces'²⁶ or indication of 'yes' or 'no,' customized emojis were used to determine responses (Figure 2). To overcome obstacles associated with using a Likert Scale with children,²⁷ emoji faces varied in relationship to the strength of response and were accompanied by words rather than numbers. Responses were recorded such that each emoji represented a point on a 1 to 5 Likert scale with 1 reflecting "ABSOLUTELY NOT" and 5 reflecting "YES!" (Figure 2).²⁷ Prior to administration, cognitive testing with a small, convenience sample (n=5; grades K-4) was conducted to determine how the expressions would be interpreted. Except for "No," students indicated agreement with the label associated with each face. Originally a face with a tear depicted "No." but students thought that face represented "Sad." The emoji was changed to a face with a line for a mouth. Furthermore, students were asked to raise their hands to determine previous experience with survey taking (pre-test) and to reflect on their survey enjoyment (post-test) by mobilizing to

an emoji. Questions were designed to repeat phrasing from the show in an attempt to separate “Jump with Jill’s version” of knowledge and attitudes from other sources.

[FIGURE 2: INTERACTIVE EMOJI LIKERT SCALE SURVEY WITH QUESTIONS]

Survey Administration

Stations containing either a beverage (energy drink, fruit drink, soda, milk or water) (Question 1) or an emoji (Questions 2-7) were arranged. Before starting the survey, students were told by *JWJ* characters that there was no right answer and that the survey was not a test. To capitalize on the power of peer influence, students make a “Promise to be Honest” as a commitment to being thoughtful “research subjects” where their authentic opinions were valued. To minimize group think, students were asked to select their answers *before* moving to a station. Students were then asked to fully commit to their answer by lining up by the emoji that matched their response (Figure 3). The *JWJ* cast recorded the number of children at each station for each question. After the show, students reaffirmed their honesty pledge and repeated the pre-survey process.

[FIGURE 3: SURVEY IMPLEMENTATION STRATEGY]

Data Analysis

Frequencies were calculated from recorded responses. Two types of outcomes were determined using aggregated data from all schools and time points (pre-test, post-test): the proportion of responses (children lining up behind an emoji) and an overall score. The proportion of responses per time point was calculated as: sum of children lining up behind an emoji divided by total of children lining up behind all emojis multiplied by 100. Pairwise differences among

dependent proportions were tested using simultaneous 95% confidence intervals among the dependent proportions (assuming a multinomial distribution).^{28,29} The overall score was calculated (for all but question 1) by multiplying the emoji's response choice (1-5) by the number of children lining up behind it, then summing all multiples for each time point and school. Higher overall scores indicate more positive responses. Differences in scores between pre- and post-tests were determined. Distribution of overall scores and differences were determined to be non-normal using normality testing and graphical plots. The Wilcoxon Signed-Ranks test was conducted to examine differences in responses between pre- and post-test scores using Statistical Analysis Software (version 9.3, 2011, SAS Institute Inc, Cary, NC).

RESULTS

JWJ performed 50 shows reaching nearly 14,700 elementary school students in the 2015-2016 school year. Over 75% of the 194 3rd graders participating in the evaluation reported no previous experience with taking a survey. Following the show, statistically significant differences in individual scores were noted for questions 1, 3, 4, 5 and 7 (Table 1); all aggregate responses became significantly more positive (Table 2). Furthermore, approximately 85% reported the highest positive rating (YES!) to participating in this survey, and 95% reported positive ratings (YES! or Yeah) to participating in the survey, which differed significantly from the number of children reporting negative ratings (ABSOLUTELY NOT and No) ($P < 0.0001$).

DISCUSSION

Overall, feasibility for using media strategies to change student knowledge and intention as well as to evaluate these changes was confirmed. Use of enthusiastic endorsement of the expected behaviors (a Social Learning Theory component) by *JWJ* characters (a marketing strategy) appeared to stimulate change in nutrition knowledge and intention in 3rd grade students. These findings confirm previous observations that theatrical interventions in schools can be successful.^{14–16,30,31}

Unique to this study was the integration of media strategies into the evaluation process. Edutainment and gamification techniques successfully captured changes in 3rd grade students' knowledge and intention. Making the evaluation process interactive and fun resulted in over 95% of students enjoying participation in a study, in contrast to reports of student stress in relation to testing.^{32,33} Additionally, children in 3rd grade are in Piaget's concrete operational phase of cognitive development, where they begin to use inductive logic and become less egocentric.³⁴ Using the "Promise to be Honest" pledge built upon their developing senses of having unique thoughts and of fairness.³⁴ Perfecting this gamification of nutrition education evaluations may serve the field by increasing accuracy of student responses when language, reading level, or survey inexperience are barriers. These study participants saw the evaluation as part of the intervention, so creating a positive experience at all touch points appears to deepen satisfaction.

Several limitations must be acknowledged. This current study lacks follow-up to demonstrate students' knowledge retention or behavior change. Other limitations include lack of a control group and unpaired pre- and post- survey data, both of which restrict generalizability.

Furthermore, statistically significant proportions that change by a fraction of a decimal to a few points must be interpreted with caution.

CONCLUSIONS AND IMPLICATIONS

The mass media has proven successful at impacting food intake in children.⁹ If ‘celebrities’ can shape social norms about unhealthy behaviors, then nutrition educators might be able to use these same strategies to shift youth toward healthy behaviors. If children demand high quality entertainment, then health-related media can compete. The media could be the best guide in developing solutions to address youth health.

To provide additional validation for using media strategies in nutrition education, along with the impact of *JWJ* on food choice behavior, future studies including a comparison group, more follow-up data points, demographic characteristics of children, and other confounding variables are warranted.

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