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Classroom Techniques

Food Safety Education Using Music Parodies

Carl K. Winter, Angela M. Fraser, Jeanne B. Gleason, Susan K. Hovey, Sandra M. McCurdy, and O. Sue Snider

ABSTRACT: Musical parodies of contemporary songs with their lyrics altered to address current food safety issues were incorporated into a variety of food safety educational programs and the effectiveness of the music was evaluated by semiquantitative and qualitative measures. Audiences receiving the music-enriched curricula included school foodservice supervisors, school foodservice managers, culinary arts instructors, culinary arts students, Family and Consumer Sciences teachers, and youth aged 8 to 12 y and studies were conducted in South Carolina, North Carolina, and Delaware. Among school foodservice supervisors, school foodservice managers, and culinary arts students, most participants were able to recall the main points of each song that was introduced in the curriculum. The culinary arts students were less likely to recall the main points of each song than were the other 2 groups, possibly because of the lack of prior knowledge of food safety practices as well as a lack of preference for the style of songs used. Family and Consumer Sciences teachers were enthusiastic about the use of the music but also identified potential barriers to the successful use of the music, due to the potential lack of appropriate audiovisual equipment, a lack of skills in using such equipment, and time constraints for the use of music in curricula due to the strong emphasis on end of year testing. Participants in the summer youth groups demonstrated significant increases between pre- and posttest examinations of safe food handling behaviors and most were able to quote lines or phrases from the songs.

Introduction

Music has frequently been used as an educational tool to improve recall of text and factual information (Chazin and Neuschatz 1990; Davies 2000) and advertising slogans (Yalch 1991; Roehm 2001). Music may help integrate the function of both brain hemispheres because it stimulates the brain to allow learning to be faster, easier, and more fun (Davies 2000). It has also been studied as a tool to provide cues that may trigger the recall of complex information (Rubin 1977; Calvert and Tart 1993). Music can be an effective way to educate diverse audiences such as children (Wolfe and Horn 1993; Chazin and Neuschatz 1990), young adults (Wallace 1994; McElhinney and Annett 1996; Smith and Phillips 2001; Rainey and Larsen 2002), older adults (Smith and Phillips 2001), and the learning disabled (Bottari and Evans 1982). In addition, the use of background music or music as way to introduce a new topic may serve to remove some barriers to learning as well as reducing student pulse rates and blood pressures (Blanchard 1979; Savan 1999).

Because music is capable of educating diverse audiences across a wide variety of topics, it seems reasonable that contemporary food safety issues could be effectively addressed using music as a vehicle to convey complicated and often controversial information. The linkage of music with contemporary food topics of interest represents a unique and innovative method for educating a wide variety of audiences about food issues. Many food topics have generated considerable news headlines and consumer concerns in the past few years; these include genetic engineering, food irradiation, bovine spongiform encephalopathy (BSE or Mad Cow Disease), obesity, food additives, bio-terrorism, and chemical contaminants such as pesticides in the food supply. Additionally, it has been estimated that 76 million cases of foodborne illness occur each year in the United States from microorganisms such as bacteria, fungi, and viruses, and include 325000 cases of hospitalization and 5000 deaths (Mead and others 1999). Many of these cases are theoretically preventable through safe handling and preparation of food items at the retail, restaurant, and home settings. The development of successful innovative educational programs using music or other tools could significantly reduce such incidents of human illness, particularly in settings that require testing, as setting food safety facts to music can make memorization easier.

Since 1996, the 1st author of this study has used a musical approach for education that involves developing parodies of contemporary songs featuring altered lyrics that make the songs appropriate to a wide range of food safety topics. Several of the songs incorporate repetitive melodies, consistent rhythmic structure, strong end-rhymes, and imagery; such techniques have been shown to be effective in other educational efforts that involve music (Gfeller 1982).

MS 20080849 Submitted 10/28/2008, Accepted 1/18/2009. Author Winter is with Dept. of Food Science and Technology, Univ. of California, Davis, CA, U.S.A. Authors Fraser and Hovey are with Cooperative Extension Service, Clemson Univ., Clemson, SC 29634, U.S.A. Author Gleason is with Media Productions, New Mexico State Univ., Las Cruces, NM 88003, U.S.A. Author McCurdy is with Family and Consumer Sciences, Univ. of Idaho, Moscow, ID 83844, U.S.A. Author Snider is with Animal and Food Sciences, Univ. of Delaware, Newark, DE 19718, U.S.A. Direct inquiries to author Winter (E-mail: ckwinter@ucdavis.edu).

The food safety musical parodies have been disseminated through a number of channels and have generally been considered to be both popular and effective in food safety education. Hundreds of live performances of the music have been given at national and local meetings involving food professionals, foodservice workers, teachers, dietitians, environmental/public health specialists, K-12 through college age students, trade associations, scientific societies, and the general public. More than 20000 audio CDs containing the music parodies have been distributed throughout the world and the music has been the focus of numerous media reports on television and radio and in newspapers, magazines, and on-line media. The most recent audio CD contains 21 songs covering a variety of food safety topics in a variety of musical forms.

The Food Safety Music website (http://foodsafe.ucdavis.edu) receives more than 25000 individual visits per year and allows access to audio files, song lyrics, PowerPoint slide presentations, media reviews, and concert footage. A series of 6 animated music videos was added to the site in 2007 and the videos have proven to be extremely popular. In addition to on-line viewing of the videos at the Food Safety Music website, more than 5000 DVDs containing the videos have been distributed throughout the world and tens of thousands of free downloads have also been made through YouTube (http://www.youtube.com/foodsafetymusic) and iTunes (http://phobos.apple.com/WebObjects/MZStore.woa/wa/viewPodcast?i=22768272&id=273485297).

The popularity of the food safety music has resulted in numerous anecdotal accounts describing successes in using the music in a wide variety of educational settings. While encouraging, such anecdotal accounts do not allow the educational attributes of the food safety music to be properly evaluated nor do they specifically provide evidence as to how the incorporation of the food safety music into existing food safety educational curricula can be optimized.

The authors of this study received funding from the U.S. Dept. of Agriculture's Natl. Integrated Food Safety Initiative to more comprehensively evaluate incorporation of the food safety music into existing food safety educational programs and to develop additional dissemination approaches. Multiple educational environments, containing several different audiences, were selected for study due to the anticipated widespread appeal of using the music for educational purposes. Target audiences were broad and included culinary arts instructors and students, school foodservice managers, high school and middle school teachers, and youth aged 8 to 12 y.

Results from a quantitative study of high school students enrolled in a foodservice food safety curriculum funded by the project have already been published (McCurdy and others 2008). This study compared student performance in food safety knowledge and food safety attitudes between students who received a curriculum that included 9 song parodies and students receiving a curriculum that did not include the music. Students receiving the curriculum supplemented with the music, particularly those taught by experienced teachers, had significantly higher food safety knowledge scores than those in the control (no music) group. The food safety attitude responses were significantly higher for male students receiving the music compared with male students in the control group. Teachers were very positive about the incorporation of the music into the curricula and reported that it increased the enjoyment of the subject for both the teachers and the students.

This study presents findings from the other qualitative and semiquantitative studies funded by the project to evaluate the incorporation of food safety music into food safety educational curricula. It discusses studies performed at Clemson Univ. targeting school foodservice supervisors and managers and culinary arts instructors and culinary art students, studies performed at North Carolina State Univ. with middle school and high school Family and Consumer Science teachers and a study at the Univ. of Delaware including youth aged 8 to 12 y involved in a weeklong summer program.

Methods

School foodservice supervisors and managers survey

Qualitative surveys of school foodservice managers and supervisors involved in ServSafe® trainings at 5 South Carolina locations were conducted during the summer of 2003. A total of 105 foodservice managers participated. Most (103) participants were female while 66% were Caucasian and 32% were African American. Additional trainings were conducted in 2005 for 90 foodservice managers (86 female) with 66% of the participants between the ages of 41 and 60. More than half (57%) of the participants were Caucasian while 37% were African American. During the course of the trainings, 4 musical parodies containing food safety information ("You'd better wash your hands," "They might kill you/we are the microbes," "Stayin' alive," and "Don't be a gambler") were played. At the conclusion of the trainings, participants were asked to write down the main idea of each song. Participants were also asked 3 open-ended questions ("If you had a CD of this music, how would you use it at your school?" "What did you like most about the music?" and "What else would you like to tell us about the songs?").

Culinary arts teachers and students

Twenty-five culinary arts teachers involved in teaching ServSafe to their students were given a CD containing the 4 songs identified in the previous paragraph and participated in an oral survey at the conclusion of their ServSafe manager training during the summer of 2003. Participants were asked "How will you use this food safety music in your classrooms" and "What kinds of music do your students like?" The teachers were also asked if they thought their students would like to work on a special project dealing with food safety songs.

The teachers incorporated the music into their classes of 267 culinary arts students. The composition of students was 64% female with 90% of the students between 15 to 18 y of age. African American students comprised 72% of the total while Caucasian students represented 24%. At the conclusion of the classes, students received an oral survey consisting of 5 questions: 1) Do you remember the music that was played during the training? 2) Do you remember the main message of each of the songs? 3) Did you like the music? 4) What kinds of music do you like? and 5) Any additional comments?

Family and Consumer Science teachers

North Carolina middle school and high school Family and Consumer Science teachers were invited to participate in a survey to evaluate the potential use of the food safety music in their curricula during the summer of 2006. The survey involved reviewing the Food Safety Music website (http://foodsafe.ucdavis.edu) and identifying songs/topics that would be most useful in their teaching. Teachers were also asked to provide feedback concerning the animated music videos. In addition, the survey included questions regarding how the teachers anticipated using the music in their classes and whether they had the appropriate equipment and training to do so appropriately.

A total of 17 Family and Consumer Science teachers responded to the survey. The average age of the teachers was 49 (range 25 to 60 y) and their teaching experience averaged 17 y (range 3 to 34 y). Nearly all (14) taught the fundamental and advanced foods courses while only one taught culinary arts. Teachers reported spending on average 1.75 h reviewing the website and completing the survey.

Youth summer program

During the summers of 2004 and 2008, 541 and 611 youth, respectively, ranging in age from 8 to 12 participated in weeklong sessions emphasizing food safety principles. The curriculum was entitled "Don't bug me" and incorporated numerous activities, songs, and preparation of 1 food item per day. The curriculum was divided into 5 daily segments:

1. Bugs: the good, the bad, the ugly—highlighted the role of microbes in making food products, in food spoilage, and in making people ill.
2. The bug express—emphasized that microbes are hitchhikers and identified ways by which foods can become contaminated.
3. Wash those bugs away—stressed the role of handwashing in preventing foodborne illness.
4. Bugs on the hot seat or in the deep freeze?—explored ways and the rationale for keeping foods either hot or cold.
5. A bug free celebration—revisited important concepts and allowed participants to create their own song, rap, or chant.

A single song was incorporated into each daily segment. Songs included the parodies "Don't get sicky wit it," "Don't be a gambler," "They might kill you/we are the microbes," "You'd better wash your hands" (all from Dr. Winter's audio CD) as well as the "Handwashing rap" (Source: Operation Risk, Michigan State Univ. Cooperative Extension). In 2004, all songs were on CDs with lyrics handed out to each participant. In 2008, all of Dr. Winter's songs were shown as animated videos with words printed as part of the animation.

Before and after the sessions, participants were given cartoons that showed a typical situation that they might face. They were given 4 possible responses with only 1 response being appropriate. Data from pre- and posttests were gathered to determine the amount of improvement attributed to the sessions. All participants were exposed to music in their sessions so there was no specific attempt to identify the potential impacts of the music upon their responses. Qualitatively, however, participants were asked to identify their favorite song and to provide a quote or phrase from a song as an indicator of their awareness of the music.

Twelve music parodies were used in the combined studies involving school foodservice supervisors and managers, culinary arts instructors and students, Family and Consumer Sciences teachers, and the youth summer program. Their titles, origins, and main educational messages are provided in Table 1.

Results

School foodservice supervisors and managers

At the conclusion of the 2003 school foodservice supervisors training, all 105 participants recalled that music was played during the training. This question was not asked of the 90 school foodservice managers who received training in 2005.

Table 2 shows the responses of participants asked whether they remember the main message of each song. For the school foodservice supervisors, the main message was remembered by 90% to 96% of the participants, depending upon the song. Recollection of the main messages of the songs by the school foodservice managers was considerably lower and ranged from 71% to 81% of the participants.

Participants suggested several mechanisms by which the music could be used at their schools including playing it through the intercom, making it available in the serving lines and in the kitchen, using it as an announcement (particularly during cold and flu season and during Natl. School Lunch Week), and as the impetus for development of a skit. A small number of participants, particularly those representing the school foodservice managers, did not think the music would be suitable for high school students or adults and was more appropriate for elementary school students. Many participants commented that they liked the humor, beat, and lyrics as well as the similarity of the songs with the original songs that they parodied. Others noted that the songs provided an uplifting and informative mechanism to communicate about a traditionally somber subject.

Culinary arts instructors

An oral survey of culinary arts instructors following their ServSafe training identified several potential applications of the music. The use of the music to introduce a concept was frequently suggested and many teachers thought that starting off with the music might empower students to develop their own songs, videos, or CD covers. It was also suggested that the students could use the music to help teach younger children about food safety. All 25 teachers surveyed agreed that they would like their students to work on a special project dealing with food safety songs.

Table 1—Music parodies used in food safety education.

Parody title	Original song parody is based on (artist)	Main message of the song
You'd better wash your hands	I wanna hold your hand (Beatles)	Handwashing at the right times is important
They might kill you/we are the microbes	We will rock you/we are the champions (Queen)	Microorganisms that can make you sick exist and they are everywhere
Stayin' alive	Stayin' alive (BeeGees)	Exercise care when handling food
Don't be a gambler	The gambler (Kenny Rogers)	Do not take chances when cooking or serving food
Don't get sicky wit it	Getting' jiggy wit it (Will Smith)	Follow basic steps to keep your food safe
I will survive	I will survive (Gloria Gaynor)	Food safety education is important and easily accessible
Money for nothing	Money for nothing (Dire Straits)	Faculty positions are great jobs
Who left the food out	Who let the dogs out (Bahamen)	Keep food refrigerated or suffer the consequences
USDA	YMCA (Village People)	The USDA has many roles in food safety, agricultural production, nutrition, and economic development
Veggie believer	I'm a believer (Neil Diamond, The Monkees)	Eating vegetables is good for your health
Eat it	Beat it (Michael Jackson)	Eat a diet in moderation with lots of variety
Stomachache tonight	Heartache tonight (Eagles)	Undercooked chicken can make you sick

Table 2—School foodservice supervisor and manager response to "Do you remember the main message of each song?"

Name of song	Percentage who remembered the main message—supervisors	Percentage who remembered the main message—managers
You'd better wash your hands	96	81
They might kill you/we are the microbes	90	72
Stayin' alive	93	71
Don't be a gambler	94	77

Table 3—Culinary arts student response to "Do you remember the main message of each song?"

Name of song	Percentage who remembered the main message
You'd better wash your hands	78
They might kill you/we are the microbes	62
Stayin' alive	74
Don't be a gambler	53

Culinary arts students

Of the 247 students who responded to the question "Do you remember the music that was played during the training?" 233 (94%) responded positively. When asked "Did you like the music?" only 41% said "yes" while 59% said "no." The % ages of students remembering the main message of each of the songs ranged from 53% to 78%, depending upon the song (Table 3). When asked "What kinds of music do you like?" the most popular musical style was rap, followed by rhythm and blues, country, hip hop, gospel, rock, and jazz.

Some of the specific comments from the students (and from their teachers) were illustrative of the mixed reaction of the students to the music:

1. "Even though they didn't like the music at first, some students commented they found themselves singing the songs at home. They began asking to play the CD in class when working in the lab."
2. "Thanks, my teacher let me rap."
3. "I did not pay much attention."

Family and Consumer Science teachers

Teachers were asked to listen to all of to the songs on the Food Safety Music webpage (http://foodsafe.ucdavis.edu) and then rank them in terms of the songs that they liked the most and those they thought their students would like the most. Results of the rankings are shown in Table 4. Findings suggest that the teachers (average age 49) preferred the older parodies while they thought their students would prefer songs that are more contemporary.

Teachers also were asked to rank the animated videos in terms of their preference and their perceptions of student preference. Results of the rankings are shown in Table 5. Teachers felt that the song their students would prefer the most was "Don't get sicky wit it," the most contemporary song in the most contemporary style (rap) while the same song was ranked lowest in terms of teacher preference.

Fourteen of the 17 teachers indicated that they had the equipment to play audio CDs and videos in the classroom although 8 mentioned that they would need to obtain projection equipment from elsewhere in the school while 7 mentioned they would need additional training to successfully use food safety

Table 4—Family and Consumer Science teachers' top 8 song preferences and their predictions as to student preferences ($N = 17$).

Teacher		Student	
Song	Number preferred	Song	Number preferred
I will survive	13	You'd better wash your hands	9
Money for nothing	11	Don't get sicky wit it	8
You'd better wash your hands	10	Who left the food out?	7
Don't be a gambler	10	I will survive	6
Don't get sicky wit it	9	USDA	6
Who left the food out	9	Veggie believer	5
USDA	8	Don't be a gambler	4
They might kill you/we are the microbes	8	Eat it	4

Table 5—Family and Consumer Science teachers' animated video preferences and their predictions as to student preferences ($N = 17$).

Teacher		Student	
Video	Number preferred	Video	Number preferred
Don't be a gambler	12	Don't get sicky wit it	13
Stomachache tonight	11	Stomachache tonight	10
They might kill you/we are the microbes	7	Don't be a gambler	8
Don't get sicky wit it	6	They might kill you/we are the microbes	6
You'd better wash your hands	6	You'd better wash your hands	5

music songs and videos in their classrooms. Three teachers indicated that their major concern was to be able to free up enough time to make adequate use of the songs and videos.

Teachers were asked to identify the perceived benefits of using the songs and videos in their classrooms. Nearly all mentioned that they would plan to open the class with music. Their perceived benefits from using the music are consistent with many of those demonstrated in the scientific literature concerning the influence of music on learning. Several perceived benefits were mentioned, including:

1. "They would listen, they can identify easily with music, retention would be longer."
2. "They would pay better attention and do better on ServSafe exam and VocCATS test."
3. "Music makes the learning more fun and puts the information into a different, catchy format to help them remember better."
4. "Provides variety, change of pace, repeats key concepts."
5. "It will get their attention, and will particularly help those who are oral and musical learners."
6. "Reinforce concepts. Students learn better when they use all the senses; would help some slow learners remember concepts."
7. "Helps the students learn without knowing it; makes learning fun."

Teachers were also asked what methods they would use to determine if the music made a difference with their students. Several mentioned that they would compare test scores of students in previous years with those who received the music as part of their training. Others suggested that students be allowed to create their own songs, to incorporate music into class

Table 6—Comparison of pre- and posttest results of safe food handling behaviors reported by children (ages 8 to 12 y) in the 2004 youth summer program (*N* = 541).

Food handling behavior	Pretest (percent correct answer)	Posttest (percent correct answer)	Improvement (%)
Putting milk in the refrigerator	84	97	13
Using same plate for raw and cooked meat	64	90	26
Slicing vegetables on board used for raw chicken	69	93	24
Keeping food for someone late for a meal	56	85	29
Washing hands before a meal	68	86	18
Keeping lunch at a safe temperature	71	86	15

Table 7—Comparison of pre- and posttest results of safe food handling behaviors reported by children (ages 8 to 12 y) in the 2008 youth summer program (*N* = 611)

Food handling behavior	Pretest (percent correct answer)	Posttest (percent correct answer)	Improvement (%)
Putting milk in the refrigerator	89	96	7
Using same plate for raw and cooked meat	68	75	7
Slicing vegetables on board used for raw chicken	77	86	9
Keeping food for someone late for a meal	61	74	13
Washing hands before a meal	70	75	5
Keeping lunch at a safe temperature	72	79	7

presentations, and to judge the songs and videos to determine which ones were the best. All of these approaches would allow the level of engagement of the students to be assessed.

Youth summer program

A comparison of pre- and posttest results concerning safe food handling behaviors is provided in Tables 6 and 7. Improvements between pre- and posttest scores were evident for all behaviors and ranged from 13% to 29% in 2004 and from 5% to 13% in 2008. Since all participants were exposed to the songs in this curriculum, there is no way to quantitatively identify the impact of the songs on improved understanding of safe food handling behaviors. It can be concluded, however, that the curriculum that included the songs did significantly improve knowledge of safe food handling behaviors of the participants.

The posttest did ask participants to identify their favorite song. In 2004, the most popular song was "Don't get sicky wit it" (favored by 33% of the participants) followed by "Handwashing rap" (16%), "Don't be a gambler" (13%), "They might kill you/we are the microbes" (11%), and "You'd better wash your hands" (10%). However, in 2008 the most favored song was "They might kill you/we are the microbes," which was favored by 48% of the youth. This song was followed by "Don't get sicky wit it" (29%), "You'd better wash your hands" (10%), "Handwashing rap" (9%), and "Don't be a gambler" (4%). Participants were also asked to quote a line or a phrase from a song and the most popular responses (227 total) involved the topic of handwashing in 2004. Although handwashing was still a popular topic in 2008, microbes might kill you (131 total) was most often noted. Such differences in responses between 2004 and 2008 may be attributed to the different methods used to deliver the music; the 2004 studies relied upon audio CDs and printed lyric sheets while the 2008 studies used animated videos with the lyrics embedded into the videos.

Discussion

The use of music parodies to educate about food safety represents a promising approach that generated enthusiasm among food safety instructors surveyed in this study. Positive correlations between the use of music and increases in food safety understanding/awareness were observed among all of the audiences (school foodservice supervisors, school foodservice managers, culinary arts instructors and managers, Family and Consumer Science teachers, youth) surveyed. Such findings are similar to those obtained from previous studies (McCurdy and others 2008) and from anecdotal reports.

It is interesting to compare the responses of school foodservice supervisors, school foodservice managers, and culinary arts students when asked if they remembered the main points of each of the 4 songs they listened to. Recollection of the main points was typically much higher for the school foodservice supervisors (90% to 96%) than for the school foodservice managers (71% to 81%) or for the culinary arts students (55% to 78%). The differences in responses may be attributed to differences in awareness of food safety issues prior to the trainings with school foodservice supervisors considered to be more aware than school foodservice managers, who would likely be more aware than culinary arts students. School foodservice supervisors are also more likely to be involved in the day-to-day operations while managers often focus more on budget and recipes, which might explain the difference in knowledge levels. Interestingly, all 3 groups had a greater recollection of the main point of the song "You'd better wash your hands" than they did of the other songs. This finding seems intuitive as the message is firmly embedded into the title of the song and suggests that attention should be given to name other song titles to make it easy to understand the main point(s) of the song.

When asked if they liked the music, a majority of culinary arts students (59%) said "no." This finding may be attributed to the choice of songs provided the culinary arts students, which included 1 rock song, 1 pop song, 1 country song, and 1 disco song. When asked about their musical preferences, the top choice among the culinary arts students was rap, followed closely by rhythm and blues. These findings suggest that considerable effort should be made to identify songs/musical styles to which the target audiences can relate. Even with this apparent disapproval of the music among many culinary arts students, the culinary arts teachers still enthusiastically supported using music in the curriculum and anecdotal evidence was obtained to suggest that the students became more enthusiastic as they became more familiar with the music. The Family and Consumer Sciences teachers also indicated that student preference of songs might be different from the teacher preference and suggested that more contemporary songs in more contemporary styles might suit their students better.

Because a large number (63%) of students enrolled in the Family and Consumer Sciences track are identified as "special population" due to handicapping conditions and/or academic or economic disadvantages, the Family and Consumer Sciences teachers were very enthusiastic about the novel attributes of

using music in food safety education as they felt that it might be more effective than the traditional curricula in reaching many of these students. The Family and Consumer Sciences teachers also identified challenges they faced in implementing this novel approach. Many of the teachers felt that they lacked the proper training and/or access to equipment to appropriately use the music in their food safety curricula.

Several Family and Consumer Sciences teachers also expressed concern about having the luxury of time to appropriately use the music in their curricula. They indicated that there is a strong emphasis on end of year testing and that all curricula, including music, needs to support the concepts that will be assessed on the tests. It is suggested that additional musical curricula could be developed to serve as a "study guide" to help students learn and remember specific facts such as internal cooking temperatures, sanitizer concentrations, refrigerator conditions, or other facts that they would likely be expected to provide during testing.

While the design of the curriculum used for the youth summer program was not sufficient to isolate the impact of the music upon the improvement between pre- and posttest food safety behavior scores, the finding that many students were able to successfully quote lines or phrases from the songs, particularly relating to handwashing and the concept that microbes might kill you suggests that the music did have a positive impact upon their understanding of important food safety issues. Additionally, use of animation may have a different impact than playing only a recording of the music as evidenced by the popularity of "They might kill you/we are the microbes" in 2008 compared to 2004.

Conclusion

It should be acknowledged that the use of music in food safety education programs is no substitute for traditional curricula. At the same time, however, the music has been demonstrated to supplement traditional educational approaches very well by introducing variety into the curricula as well as sensory stimulation and humor. Further development of musical approaches to educate about food safety is envisioned and should be accompanied by appropriate evaluative steps utilizing both quantitative and qualitative approaches.

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