Teens Teach Skin Cancer Prevention

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ABSTRACT: *Cumulative sun exposure has been linked to about 95 percent of all skin cancers. Farmers and their families, by nature of their occupations, are exposed to an abundance of sun over a long period of time and, therefore, are at an increased risk for skin cancer. Because education is known to be a primary means of health, Future Farmers of America (FFA) peer facilitators (teen educators) provided third graders in rural communities sun protection education with the hope that the message would reach the entire family. The FFA facilitators (n=217) from 39 FFA organizations throughout Wisconsin were trained with skin cancer and sun protection information. The FFA facilitators then gave presentations on sun protection to third graders (n=2,007) in their school districts. Control schools included 57 facilitators and 669 third graders. Evaluation involved pre-, post-, and six-month follow-up surveys testing knowledge gained by the third graders. Students who correctly responded to a question on the post-survey after incorrectly answering it on the pre-survey were said to have had a knowledge gain for that question. By using* chi-square *tests, the intervention group demonstrated a statistically significant (P<0.001) higher proportion of students experiencing knowledge gain than did the control group from pre- to post-surveys for nine of the 10 questions. Summary statistics were used to describe the study population. In addition to skin cancer knowledge questions, the survey of facilitators included sun protection behavior and attitude questions. This intervention was able to use peer educators as instructors to demonstrate knowledge gain in the youths of the target population. The pilot project materials costs were $0.55 per third grade student and $3.50 per facilitator. Using a school-based organization such as FFA provided a cost-effective means of reaching the rural population.*

In 1990, the National Institute for Occupational Safety and Health (NIOSH) awarded a three-year cooperative agreement to the National Farm Medicine Center (NFMC) to fund the Wisconsin Farmers' Cancer Control Program. The program was designed and implemented by NFMC in collaboration with the Wisconsin Department of Health and Human Services, the American Cancer Society—Wisconsin Division (ACS), and NIOSH. Its purposes were to identify the problems Wisconsin farmers and migrant agricultural workers faced in obtaining adequate health care and to design and test interventions capable of improving access to cancer education and screening. Accordingly, both educational and intervention components were developed and field tested among farm populations in north-central Wisconsin. Skin cancer was targeted because of its reported high incidence among farmers (Blair & Zahm, 1991; Burmeister, Everett, Van Lier, & Isacson, 1983; Delzell & Grufferman, 1985; Howe & Lindsay, 1983). Breast and cervical cancers, although not farm related, were also chosen, since accepted screening methods for these cancers exist (Reding, Anderson, Lappe, Hanrahan, & Haskins, 1991).

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Three key recommendations gathered prior to this project from farm family focus groups were employed during the project: the importance of education materials being simple and brief, the need for educating farm children on healthy lifestyles and cancer risks, and the need to conduct education on the farm. The educational component targeted the farming community using three existing farm-oriented organizations to deliver skin cancer prevention education to rural youths and adult farmers: schools (using FFA members as peer educators for third-grade students), the family (involving Cloverbuds in the Cooperative Extension 4-H Youth Development), and adult residents of the farm (using veterinarians to deliver educational materials). The remainder of this article discusses only the school-based intervention.

Background

The incidence rate of melanoma has increased about 4 percent per year since 1973. There has been a steady increase in the number of nonmelanoma skin cancers since 1988 (American Cancer Society, 1994). Cancer has been reported as the second leading cause of death among male farm residents and the leading cause of death among female farm residents (McDuffis, Pahwa, & White, 1992). While overall relative risks (RR) for cancer among farmers are typically reported below 1.0, certain selected cancers exhibit statistically significant relative risks above 1.0. Examples of these include leukemia (RR=1.5-3.7), non-Hodgkin's lymphoma (RR=1.6-1.9), Hodgkin's disease (RR=1.7-4.0), multiple myeloma (RR=1.5-3.4), and site-specific cancers of the lip (RR=2.6-5.3), stomach (RR=1.6-8.3), skin (RR=1.2-2.5), prostate (RR=1.1-1.2), brain (RR=1.6-5.0), testes (RR=1.5-6.3), and connective tissue (RR=1.7-2.7) (Blair & Zahm, 1991; Giles, Lickiss, Baikle, Lowenthal, & Panton, 1984; Haguenoer, Cordier, Morel, Lefebvre, & Hemon, 1990; Mills, Newell, & Johnson, 1984; Musicco, Filippini, Bordo, Melotto, & Berrino, 1982; Saftlas, Blair, Canter, Hanrahan, & Anderson, 1987). The emergent role of cancer is due in part to observed declines in death rates from disease of the circulatory system and all arteriosclerotic heart disease, as well as modern farming practice that may predispose farmers to selected malignancies.

In an attempt to make farmers and their families more aware of their skin cancer risks, as well as to design strategies to deal with these risks, a series of protocols was developed. This project was seen as an opportunity to help accomplish national health goals regarding health promotion and disease prevention as outlined in *Healthy People 2000* (Department of Health, Human Services & Public Health Services [DHHS & PHS], 1990). The focus was skin cancer prevention and sun protection education.

In an attempt to reach those in a rural community who may not be reached by other health professionals (Green & Kreuter, 1991; USDHHS & PHS, 1990), an intervention was designed using an existing school-based agricultural education program. The FFA was chosen as one vehicle to reach the farming community. The FFA is a national association of high school agriculture students preparing for careers in agricultural production, processing, supply and service, mechanics, horticulture, forestry, and natural resources. A prominent feature of the organization is its use of peer education whereby older students teach younger children agricultural principles. Previous peer education programs in FFA have been focused on farm safety and the *Building Our American Communities* program (FFA, 1971). Sun protection and skin cancer awareness fit easily into this format.

Peer education is an important part of health education programs that have been in use for several decades (Fork, Wagner, & Wagner, 1992; Perry, Killen, & Slinkard, 1980; Perry, Klepp, Halper, Hawkins, & Murray, 1986). Same-age or slightly older students facilitate education programs among younger peers. The peer education process appears to have a positive effect on academic and attitudinal growth for both the peer educators and the receivers. Since peer education has been shown to support behavioral changes, it is hoped that the same can occur with skin cancer prevention (Remafedi, 1994; Kelly, et al. 1992; Slap, Plotkin, Khalid, Michelman, & Forke, 1991).

Literature reveals that adults often have difficulty making lifestyle changes because of habits and behavior learned in early childhood (Corcoran & Portnoy, 1989). It is believed that the full potential of health education can be reached through the education of our youths. An additional important reason for directing cancer education programs at youths is that children may take home specific messages that may lead to parental and older sibling action (Luepker & Perry, 1991).

This project was designed to take advantage of the FFA's strength while teaching concepts of human health referable to sun protection and skin cancer. The curriculum emphasized the ABCs of sun protection (A=Away, B=Block, C=Cover-up, and S=Speak

out) (American Academy of Dermatology / American Cancer Society, 1990). It was hypothesized for this study that educating younger children about the risks of sun exposure may alter their behavior and change perceived attitudes about sun exposure. With behavior changes regarding total ultraviolet exposure and preventing sunburn, it is hoped that skin cancer could be prevented (Hurwitz, 1988; Marks, Jolley, Lectsas, & Foley, 1990; Stern, Weinstein, & Baker, 1986).

The planning process involved the American Cancer Society—Wisconsin Division staff, state FFA representatives and local FFA advisors, and members of the local FFA chapters. It was felt that this would ensure successful integration of existing educational materials into the project, with the hope that these two organizations could continue their alliance once funding for the project was terminated.

Methodology

Research Design. The goal of the project was to deliver sun-protection education to youth via the FFA organization based on the hypothesis that school-based youth-directed sun-protection education delivered via youth health facilitators (FFA members) would result in increased sun-protection knowledge among younger children.

A pilot project, reported elsewhere (Reding, Fischer, Gunderson, & Lappe, 1995), was carried out in the 1991-1992 school year involving six high schools in three counties in north central Wisconsin. The counties were chosen because of high farming populations and distance from a large tertiary care center.

Results of the pilot project showed a statistically significant knowledge increase for the intervention third graders when compared to control third graders from pre- to post-survey. The pilot project offered an opportunity to realize mistakes made and correct these for the statewide intervention.

To see whether this project would be successful on a broader basis, it was expanded statewide by randomly choosing four FFA chapters from each of 10 sections into which Wisconsin is divided. Within each section, three of the schools were intervention and the fourth one was a control. FFA facilitators were trained for the intervention schools at a site within the section, and the sun protection education was presented to third graders in those school districts. Control schools received no education on sun protection at this time, control third graders simply completed the three surveys. This decision was due in part to avoid contamination problems similar to what had occurred in the pilot project. Project staff provided skin cancer / sun protection training for the FFA members in the control schools the following year.

Curriculum Content and Program Implementation. The Children's Guide to Sun Protection K-3 developed by the American Academy of Dermatology and the American Cancer Society (1990) was used for the intervention. ACS evaluated the curriculum with 17 teachers in schools in Montana, Mississippi, and Nevada (T.G. Pearson, personal communication, June 12, 1992). Background information on the basic anatomy of the skin, skin cancer, the sun, the damage it causes, and methods of sun protection were included in the curriculum. Learning objectives, lesson plans, and extended activities along with a poster, worksheets, and hand-outs dealing with sun protection were provided. The lesson plans developed specifically for second and third graders were used.

Project and ACS staff trained the FFA facilitators at a one-day workshop in their specific geographic areas in March. The workshop included background information on skin cancer and sun protection, the introduction and practice of the sun-protection curriculum, and some teaching skills training. They also received instructions on administering the pre- and post-surveys to the third graders.

The FFA members presented the education materials to third graders in their school districts in April and May 1993 (in preparation for peak sun exposure time in the summer). The education was conducted in two 30- to 40-minute sessions on two days within a one-week period. The timing of the education sessions was coordinated by the advisers associated with each school facilitator group.

As part of the education process, the third graders used sun-protection activity sheets that could be taken home. Other materials distributed at the end of the intervention (to be taken home to the family) included the skin cancer brochure developed by project staff specifically for adult farmers, an informational skin cancer sheet from ACS, and a sunscreen sample.

Data Collection Procedures. A survey instrument consisting of 10 knowledge-based questions about sun protection was developed for the third graders (Figure 1). The survey was circulated to a jury of educators (comprised of two directors of education, two health coordinators, an extension home economist, two educators, and two researchers, all from central Wisconsin) for evaluation and several revisions before

Figure 1. Survey Instrument for Third Graders.

1. When should you protect yourself from the sun?
   a. summer only
   b. spring and summer
   c. the whole year

2. The time of day when the sun is strongest is....
   a. early morning
   b. noon
   c. late afternoon

3. The best way to protect yourself from the sun is by using....
   a. baby oil
   b. sunblock
   c. tanning lotion

4. I will wear sunblock number....when I'm outside.
   a. 10
   b. 12
   c. 15 or greater

5. The skin type that needs the *most* sun protection is....
   a. light color skin
   b. medium color skin
   c. dark color skin

6. In the ABCs of sun protection, the A means....
   a. away
   b. after
   c. always

7. In the ABCs of sun protection, the B means....
   a. block
   b. baby oil
   c. burn

8. In the ABCs of sun protection, the C means....
   a. check
   b. color
   c. cover up

9. What SPF number should be on sunblock that your family buys?
   a. 10
   b. 12
   c. 15 or greater

10. Which one *does not* protect you from the sun?
    a. long sleeve shirt
    b. baby oil
    c. sunblock

its final validation. Reliability was checked with survey administrations to three classrooms (two schools) within the local school system (Marshfield, WI). A pre-survey preceded the FFA facilitator presentation to the third graders at intervention sites, and a post-survey was administered at the conclusion of the second presentation. Six months later a follow-up survey was administered by the fourth-grade teachers (next-year instructors after summer vacation). Control groups were surveyed in the same manner as the intervention groups, with no education session offered between the surveys. Time and effort logs were completed by peer facilitators and advisers.

Statistical Methods. Students who correctly responded to a question on the postsurvey after incorrectly answering it on the presurvey were said to have had a knowledge gain for that question. For each of the 10 questions, the number of students experiencing knowledge gain in the intervention and control groups were compared using *chi* -square tests. The control and intervention group change score values were compared using the Mann-Whitney U test. A conservative significance level of 0.01 was used in comparisons of the 10 individual questions.

Results

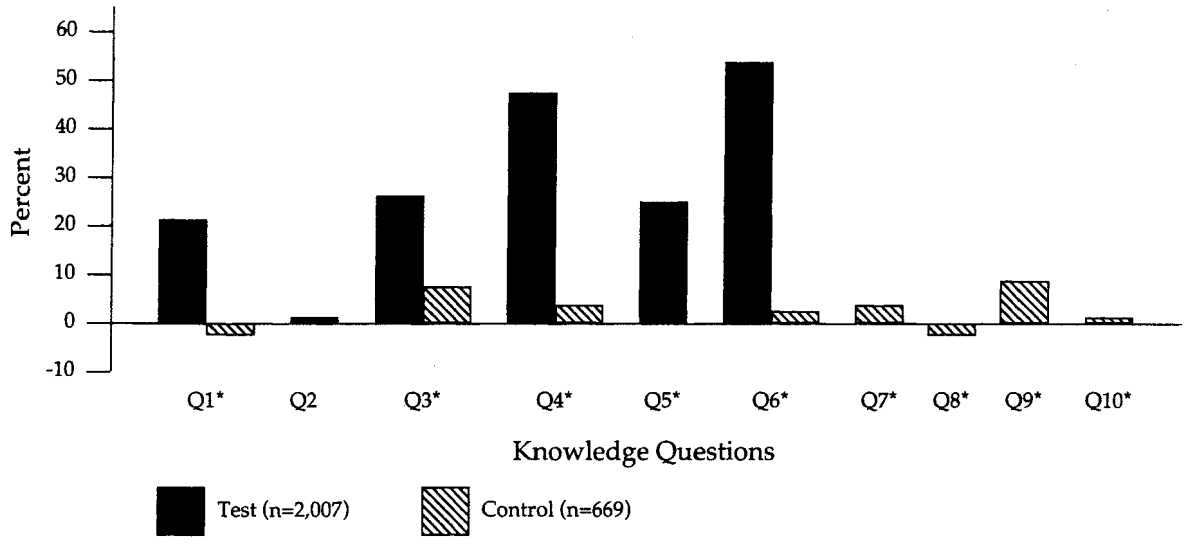
The survey was administered to 3,142 third graders. The three survey instruments were fully completed by 2,676 (85%) students, and these were included in the evaluation process. Lack of paired responses in 466 students (406 intervention, 60 control) was due to absences when any one of the surveys was administered, the relocation of students from one school year to the next, and inconsistent procedures while administering surveys.

There were no significant differences between the intervention and control third graders on any of the presurvey questions. Scores indicate that the two groups had similar background knowledge levels regarding sun protection at the start of the project.

For nine of the 10 questions, the intervention group had a statistically significant ($P<0.001$) higher proportion of students experiencing knowledge gain than did the control group for pre- to postsurveys (Figure 2). For question number 2, there was no statistically significant difference between intervention and control groups. This question asked, "What time of the day is the sun strongest?" Because the correct answer was already known to many of the students, there was no improvement seen between the pre- and postsurveys.

Overall, the intervention group showed significant improvement in knowledge from the pre- to the post-survey and to the six-month follow-up survey in comparison with the control group, which showed little change ($P<0.001$) for nine of the 10 questions (Table 1).

Figure 2. Knowledge Gain—Third Grade (Pre- to Post-test).



* Test and control groups significantly different ($P<0.001$) on postsurvey.

Mean knowledge scores by group are shown in Table 2. The mean improvement for the intervention group from pre- to postsurvey was 3.04 questions (SD=+/-1.91), while the control group showed virtually no improvement (mean=0.26 questions, SD=+/-1.62). From pre- to six-month follow-up survey, the mean improvement for the intervention group was 2.24 questions (SD=+/-2.07), while the control group showed virtually no improvement (mean=0.67 questions, SD=+/-2.08) (Table 2).

Time and effort logs were completed by peer facilitators and advisers. The time spent in preparation and presentation of the sun protection education sessions by the peer facilitators ranged from six to 22.5 hours, with a mean of 10.89 hours (SD=+/-3.62). Advisers reported a mean time of 11.12 hours (SD=+/-4.83) spent implementing the program, with a range of five to 23.25 hours.

An additional goal of this project was to influence the behavior and attitudes of the facilitators regarding sun protection. To this end, the facilitators were assessed by the use of a 13-question survey instrument about skin cancer/sun protection that included attitude, behavior, and knowledge questions (Figure 3). The identical instrument was used three times: at the beginning of the one-day training session, at the end of the one-day training session, and six months later.

Two hundred seventy-four FFA members (175 boys, 99 girls) were involved in the sun protection project. Two hundred forty-three (89%) facilitators (154 men, 89 women) completed all three surveys and were included in the data analysis. Reasons for lack of completion of all three surveys included relocation to new areas, higher education, and procrastination.

For facilitators completing all surveys, 72 (30%) improved their overall scores on the three knowledge questions. The majority of facilitators already knew the information. On each of the two behavior questions on the survey, an increase in the percentage of intervention facilitators who were likely to practice the desired behavior was seen. There was an improvement on question 4 ("How likely are you to wear protective clothing such as a wide-brimmed hat when you go outside on a sunny day?") of 43 percent (from 35% on the presurvey to 78% on the postsurvey), with 58 percent on the follow-up survey. Question 5 ("If you were to go outside on a sunny day for more than an hour, how likely are you to use sunscreen or sunblock?") showed an improvement of 32 percent (from 46% on the presurvey to 78% on the postsurvey), with 69 percent on the follow-up survey. There was a slight improvement seen on the eight attitude questions. The percent of desired responses on these eight questions for intervention facilitators improved from an average of 90 percent on the presurvey to 94 percent on the six-month follow-up

Table 1. Results of Three Administrations of the Knowledge Survey—Percent Correct on Each Question by Test Group.

	Intervention (n=2,007)			Control (n=669)		
Question	Pre (Percent)	Post (Percent)	Six-month Follow-up (Percent)	Pre (Percent)	Post (Percent)	Six-month Follow-up (Percent)
1**	56.2	77.1	69.8	53.5	51.9	50.2
2*	83.0	84.1	82.5	84.8	85.4	85.9
3**	81.8	97.8	97.4	78.3	85.1	90.1
4**	51.0	97.8	91.9	50.4	54.0	62.5
5**	61.9	86.9	77.7	59.3	59.0	65.2
6**	41.5	96.0	69.7	42.3	45.1	50.4
7**	64.7	97.4	87.1	62.2	68.2	71.3
8**	67.2	97.6	92.7	67.7	65.0	74.9
9**	46.9	97.8	90.6	47.5	56.7	62.6
10**	66.2	94.1	86.5	69.7	71.3	70.0

* Intervention and control groups are not significantly different on postsurvey (P=0.599) or on six-month postsurvey (P=0.077).
** Intervention and control groups significantly different (P<0.001) on postsurvey and six-month presurvey.

Table 2. Results of Three Administrations of Knowledge Survey—Mean Score for Each Survey by Test Group.

	Pre*			Post**			Six-month Follow-up**		
	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI
Intervention (n=2,007)	6.22	≠1.93	(6.05, 6.33)	9.26	≠1.00	(9.14, 9.37)	8.45	≠1.44	(8.34, 8.58)
Control (n=669)	6.16	≠1.81	(5.88, 6.37)	6.42	≠1.94	(6.22, 6.63)	6.83	≠1.96	(6.64, 7.04)

* Intervention and control groups not significantly different (P=0.642).
** Intervention and control groups significantly different (P<0.001).

survey. Control facilitators showed an improved attitude of 2 percent (from 86% presurvey to 88% follow-up survey) but no change in likelihood of practicing the desired behavior.

The pilot project materials costs were $0.55 per third-grade student and $3.50 per facilitator. Costs were similar for the statewide project.

Discussion

A definite interest of the third graders in sun protection and a positive acceptance of the peer facilitators were noted in observations by project staff in 10 of the 19 classroom interventions for the pilot

Figure 3. Survey Instrument for High School Facilitators.

1. What time of day are the sun's rays strongest?
   1 [ ] 9 a.m. to 11 a.m.
   2 [ ] 11 a.m. to 3 p.m.
   3 [ ] 3 p.m. to 4 p.m.
   4 [ ] 4 p.m. to 6 p.m.

2. Specifically what does a sunscreen of SPF number 15 mean?
   1 [ ] I am protected from sunburn for 15 hours.
   2 [ ] I am protected from sunburn 15 times longer than if I didn't use sunscreen.
   3 [ ] I will tan without burning.
   4 [ ] I must apply sunscreen every 1.5 hours.

3. What skin type needs the *most* protection from the sun?
   1 [ ] fair skin
   2 [ ] medium skin
   3 [ ] dark skin
   4 [ ] black skin

4. If you were to go outside on a sunny day for more than an hour, how likely are you to wear protective clothing such as a wide-brimmed hat?
   1 [ ] very likely
   2 [ ] somewhat likely
   3 [ ] somewhat unlikely
   4 [ ] highly unlikely

5. If you were to go outside on a sunny day for more than an hour, how likely are you to use sunscreen?
   1 [ ] very likely
   2 [ ] somewhat likely
   3 [ ] somewhat unlikely
   4 [ ] highly unlikely

6. Sunburn causes permanent damage to the skin.
   1 [ ] strongly disagree
   2 [ ] disagree
   3 [ ] agree
   4 [ ] strongly agree

7. Regular use of sunscreen with an SPF #15 or greater may help prevent skin cancer.
   1 [ ] strongly disagree
   2 [ ] disagree
   3 [ ] agree
   4 [ ] strongly agree

8. Getting a sunburn as a child increases the risk of getting skin cancer as an adult.
   1 [ ] strongly disagree
   2 [ ] disagree
   3 [ ] agree
   4 [ ] strongly agree

9. Anyone can get skin cancer.
   1 [ ] strongly disagree
   2 [ ] disagree
   3 [ ] agree
   4 [ ] strongly agree

10. A deep tan will provide more protection from the sun.
    1 [ ] strongly disagree
    2 [ ] disagree
    3 [ ] agree
    4 [ ] strongly agree

11. Sun protection is important to good skin health.
    1 [ ] strongly disagree
    2 [ ] disagree
    3 [ ] agree
    4 [ ] strongly agree

12. A deep tan means good health.
    1 [ ] strongly disagree
    2 [ ] disagree
    3 [ ] agree
    4 [ ] strongly agree

13. It's a good idea to use a tanning booth *frequently* to prepare for exposure to the sun.
    1 [ ] strongly disagree
    2 [ ] disagree
    3 [ ] agree
    4 [ ] strongly agree

project. Due to lack of time and personnel, the additional nine classrooms were not able to be viewed. Evaluations by the facilitators indicated that third graders identified them as teachers of sun protection information and appeared to recall the sun protection education project within the next three months.

Knowledge gain for purposes of analysis of this study represented students who incorrectly answered a question on the pre-survey but correctly answered that question on the post-survey. In this way, students who already knew the answer and had no possibility of improvement were not part of the analysis for that question. Knowledge retention was demonstrated via six-month follow-up surveys.

Limitations of this type of intervention include the initial effort required to start the program, the need to reevaluate educational materials at specific intervals to determine their appropriateness and educational content, and re-testing survey instruments for validity and reliability. Acceptability of this type of project is also limited by the willingness of the school and the FFA to participate and the assumption that health issues remain a priority focus.

The findings of this educational intervention demonstrate the effectiveness of peer facilitators (high school students) in educating younger students concerning a highly sensitive issue regarding human health, specifically skin cancer. The structural design of the FFA makes this type of educational intervention possible. Pre- and postsurvey analyses showed significant increases in third-grade student sun protection knowledge gained in the intervention group.

The success of this project would suggest that this teaching module could be replicated with any FFA or similar youth organization on a national scale. Coalitions could be developed with the ACS and the FFA to sustain this activity. Other human health issues concerning heart disease, cancer, and safety could most likely be adapted into this format. It appears that education presented by peers is accepted and effective.

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