Educational Action in Adolescents of a Public School about the Prevention of Skin Cancer

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Abstract

Introduction: Skin cancer is the most prevalent malignancy worldwide. It is necessary to intervene from childhood in its prevention. The lack of awareness of the population demands photoeducation activities, so that photoprotection habits are built. Goals: Compare previous and immediately acquired knowledge and attitudes of primary school students, participants in this educational action aimed at the prevention of skin cancer. Analyze student satisfaction with the educational program attended. Method: A semi-experimental, quantitative study was carried out, based on educational intervention. The teachers, mediators of the intervention, were guided by the researcher, with two dialogical workshops. The educational program was applied over ten weekly activities, based on an active method, to 32 students from the eighth year of a public school in a municipality in the countryside of São Paulo, who answered questionnaires before the beginning and after the end of the activities. Sociodemographic data and phenotypic characteristics of risk for skin cancer, as well as information about knowledge and practice of photoprotective attitudes were previously collected. At the end of the educational intervention, students answered a close-ended questionnaire on knowledge and attitudes and a questionnaire on their satisfaction with the program. Quantitative and comparative analysis was carried out between the questionnaires on pre-intervention and post-intervention knowledge and attitudes. Results: The educational program was evaluated satisfactorily by the students, contributed to the learning of important concepts for photoprotection and changing attitudes. Conclusion: The educational program on the prevention of skin cancer, aimed at children and adolescents, using active teaching-learning methods, enabled the gain of knowledge and signs of photoprotective attitudes.

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Educational and Dissemination Materials, Health Education, School Health Services, Prevention of Diseases, Skin Neoplasms, Continuing Education

1. Introduction
Skin cancer is a worldwide public health issue and investing in its prevention, starting in our early years, is the best tool to change this scenario.

Malignant neoplasms of the skin can originate from different cell types, the most common being basal cell carcinoma and squamous cell carcinoma, constituents of the group called non-melanoma skin cancer, which among skin tumors is the one with the highest incidence, corresponding to more than 95% of skin cancer cases, and the estimate for Brazil for each year of the 2020-2022 triennium is about 177,000 new cases (Sampaio & Rivitti, 2018; Chinem & Miot, 2011; Lomas et al., 2012; Instituto Nacional do Câncer, 2020). Predominantly affecting individuals with low skin phototype and with aggressiveness attributed to their power of local invasion, it confers physical mutilation and significant psychosocial damage on the patient, as well as high financial costs to families and health institutions (Lomas et al., 2012; Chen et al., 2013; Fitzpatrick, 1988).

Melanoma skin neoplasms, in turn, originate from melanocytes and dermal nevus cells and have a high fatality rate due to the high likelihood of metastasis (Sampaio & Rivitti, 2018; Weyers, 2012; Almeida, 2020).

Higher skin phototypes are not without risk. One of the subtypes of melanoma, called acral lentiginous melanoma, is almost exclusively prevalent in black-skinned individuals, and ends up being late noticed and diagnosed (Ribeiro et al., 2016).

Both types of neoplasia correlate with exposure to Ultraviolet (UV) radiation. It is assumed that acute and intermittent exposure to sunlight would be sufficient to cause melanoma, whereas, in basal and squamous cell carcinoma, chronic exposure to sunlight would be the mutagenic factor (Sampaio & Rivitti, 2018; Chen et al., 2013; Ribeiro et al., 2016). The association between tanning and melanoma in young patients is also described (Nilsen et al., 2016). Childhood sun exposure appears as the most harmful factor in the genesis of skin cancer (Bataille, 2013).

According to the World Health Organization (WHO), non-melanoma skin cancer is one of the most prevalent worldwide, and late diagnosis and inaccessible treatment are quite common (Folha Informativa Câncer, 2018).

In 2018, Brazil ranked seventh among the countries in the world with the highest incidence of non-melanoma skin cancer, and ninth in relation to the melanoma type (GLOBOCAN, 2018).

The geographic position of Brazil poses a higher risk to its population, in addition to the local culture of tanning that encourages many people to practice intentional and involuntary sun exposure, during daily and work activities.
A study on the exposure of Brazilian workers to UV rays demonstrated a daily dose of UV rays 50 times higher than the safe dose of 108 J/m² recommended by the WHO. Therefore, the adoption of photoprotective attitudes is required (Ministerio da Saúde, 2010; Instituto Nacional do Câncer, 2009).

Photoprotection measures include educational processes, topical photoprotection, oral photoprotection and mechanical photoprotection (Schalka et al., 2014).

The Brazilian Photoprotection Consensus recommends more effective photoeducation strategies (Schalka et al., 2014).

Most studies on photoeducation are not Brazilian, consist of short-term interventions, use self-reports to assess habits and have short-term follow-up (Lower et al., 1998; Buller et al., 2011; Lin et al., 2011).

It is known that the effectiveness of these measures is dependent on their pedagogical capacity in health education and their potential for raising awareness, as it should, above all, lead people to changes in habits and attitudes (Alonso et al., 2020; Rodríguez-Zamorano et al., 2018; Rocha et al., 2018).

Children and adolescents should be encouraged to adopt photoprotection habits, since photoexposure in this early stage of life is an important risk of carcinogenesis. In addition to being more receptive to prevention information, supported by models represented by teachers, children and adolescents tend to develop consolidated habits in adulthood, and may also influence other family members (Rocha et al., 2018; Reynolds et al., 1996; Bastuji-Garin et al., 1999; Kouzes et al., 2017; Jha et al., 2017; Stölzel et al., 2014).

The traditional approach has a prescriptive educational attitude, while the active approach seeks to problematize and include the listener as a protagonist in the process of deconstruction and construction of knowledge, promoting greater engagement and transformation of habits; this includes, in the process of “health literacy”, the movement of reflection and “teachback”, Diverse teaching materials and language appropriate and facilitated to the target audience (Simmons et al., 2017; Souza et al., 2018; Thomson, 2006).

Thus, the valorization of educational health measures is fundamental for changing the profile: incidence, morbidity and mortality of skin neoplasms. In face of the social representation of the teacher as a very present model in society and the potential of this role (Guimarães, 2003), this study proposes to prepare public school teachers, in an active method and health knowledge, for the application of an educational program aimed at health promotion and skin cancer prevention to primary school students.

It is hoped that the gains associated with active methods, based on meaningful learning and constructivist theories, as well as the involvement of teachers in the design and implementation of activities, can reinforce positive knowledge and attitudes related to precautions against neoplastic skin lesions (Guimarães, 2003; Eppinger et al., 2013; Guy et al., 2016; Lima, 2017).

Thus, this study, held in a typical Brazilian city, with hot temperatures and great sun exposure of the population due to the economic activity and lifestyle...
habits, seeks to compare previous and immediately acquired knowledge and attitudes of primary school students in relation to their participation in educational action aimed at the prevention of skin cancer and to analyze the students' satisfaction with the educational program attended.

2. Methods

A descriptive and quasi-experimental, quantitative study was carried out in a public school in the countryside of São Paulo, with educational interventions in health for students in the eighth grade of primary school, through previously qualified teachers.

The study was approved by the Research Ethics Committee and its members signed the Free and Informed Consent Form (ICF) and/or Free and Informed Consent Form (TALE), in accordance with Resolution 466/2012 of the National Health Council (Conselho Nacional de Saúde, 2012).

The two moments of the research were: dialogical workshops with teachers and an educational program with students; both were carried out in a public primary school in a small city in the countryside of the State of São Paulo.

The program was proposed to 3 public schools in the Municipality, and to all of its teachers, but we only had one school and one teacher interested. The age range of students and the school year to be applied was decided by the authors and the school coordinator, according to the students' intellectual background.

The participants were a primary school teacher and 32 eighth grade students, literate and able to read, write and understand, in the Portuguese language participated in the whole study. Those who did not answer the questionnaires and/or who did not participate in all the activities proposed by the teacher were excluded. The teachers were the mediators of the educational program and the students, its participants.

The researcher made teaching materials available that were used by the teacher, who contributed with ideas and suggestions to the program, so that it was active, interdisciplinary and integrated. There were two workshops lasting three hours each, fortnightly, aimed at preparing the teacher to apply the photoprotective educational program and to facilitate students' learning about skin cancer.

The educational program applied was formed by 10 weekly meetings, of 90 minutes each, totaling 15 hours of activities, over 75 days, using active teaching/learning methodologies (Thomson, 2006; Guimarães, 2003; Eppinger et al., 2013; Guy et al., 2016; Lima, 2017; Sousa et al., 2012; Glanz et al., 2002).

Prior to the educational program, the sociodemographic questionnaires Q1 and Q2, the latter called Q2-pre, were applied on the theoretical content and habits of photoprotection and skin cancer prevention. A similar questionnaire, called Q2-post, was applied after the educational program, in addition to the Q3 questionnaire.

The following theoretical support materials were used:
- Primer on skin cancer prevention released by the Ministry of Health (Centro de Previsão do Tempo e Estudos Climáticos, 2019).
- Printed and multimedia materials published by the Brazilian Society of Dermatology and the Sol Amigo da Infância Project (Sociedade Brasileira de Dermatologia, 2017b).

- Printed and multimedia materials published by the Australian and New Zealander program “SunSmartSchool”, adapted, and translated by the researcher, in Portuguese (Nova Zelândia, 2019).

- Materials published on the Internet by the website of the National Institute for Space Research and the Center for Weather Forecasting and Climate Studies (Centro de Previsão do Tempo e Estudos Climáticos, 2019).

- Educational videos available on Youtube (Youtube, 2019).

The activities of the educational program are summarized in the Table 1 below.

The questionnaires used were: R1, R2, Q1, Q2-pre, Q2-post and Q3. The R1 and R2 instruments were descriptive, to characterize the school and the teacher. Q1 and Q2 were questionnaires translated and adapted from the SunSmartSchool program, and from the Brazilian Society of Dermatology (Sociedade Brasileira de Dermatologia, 2017a; Nova Zelândia, 2019; Instituto Melanoma Brasil, 2013).

Table 1. The synthesized activities of the educational program.

| Activity | Trigger | Development | Outcome | Intercurrence |
|----------|---------|-------------|---------|---------------|
| First: I felt it on the skin | Interview with a melanoma patient | Dialogical exposition of prior knowledge about skin cancer | Exposure of personal and family stories | - |
| Monday: I can’t see it, but I can feel it. | Experiment with tonic water and a RUV pen | Group discussion on the composition of the sun’s rays; | Rescue of prior knowledge | Lots of motivation |
| Third: Keeping an eye on the sun | Access to the Brazilian Institute of Meteorology | Characterize geographic aspects of the city and region | Galileo Galilei’s experiences were recalled | - |
| Fourth: Peoples History and Photoprotection | Experiment with cans filled with water, covered with black fabric | Typical and historical clothing and habits for protection against sunlight | They discussed ways to protect themselves | - |
| Fifth: Tanning is not healthy at all | Introduction to sunscreen | Discussion of photoprotection measures, identifying the sunscreen factor (SPF) | They were introduced to sunscreen and the correct way to use it | They were very receptive to the use of sunscreen |
| Friday: Everyone is at risk | Classification of the skin phototype with public persons as an example | Understand classification and self-assess | Recognize that all skin types are at risk | - |
| Seventh: Keeping an eye on the skin | Skin self-exam | Learning about the self-exam | Apply to colleagues and look for ABCDE and Ugly Duckling moles (Ilyas et al., 2017) | - |
| Eighth: Deadly Machine | Brazilian Legislation on Artificial Tanning | Group discussion on personal stories and tanning | - | Students’ indignation |
| Ninth: Do not chicken out when taking care of your skin | How to make the school environment more protected? | Ideas for implementing new habits and improvements at school | - | - |
| Tenth: Skin protectors | How to encourage family and friends? | Work suggestions to encourage healthy practice in the community | - | - |
Q1: Close-ended questionnaire for sociodemographic analysis, such as gender, age, ethnicity, education, and income of the family provider; and risk factors for skin cancer, including personal and family history of skin cancer, skin color, eyes and hair, number of moles and spots on the body, sunburn event and photoprotection habits (Sociedade Brasileira de Dermatologia, 2017a).

Q2: Close-ended questionnaire to assess knowledge and attitudes of photoprotection and prevention of skin cancer.

Q3: Likert scale tool of satisfaction, regarding the educational program received (Likert, 1932).

Q4: Judges were invited to validate data collection tools according to the criteria: being a doctor with specialization in dermatology or plastic surgery, with a doctorate degree and being active in care or teaching. All instruments were applied to a pilot group with 15 eighth grade Primary School students in another school.

The reports were analyzed descriptively as well as the results of the questionnaires. The quantitative analysis was based on Wilcoxon and chi-square calculations with a 95% reliability index (SAS Institute, 2018).

3. Results

Descriptive aspects

Characterization of the HEI (R1) and the teacher (R1, R2 and Q1)

The participating school is a public primary and secondary school, with 731 students, with an average of 40 students per class and 39 teachers. Each class has 9 different teachers.

The curriculum is subject-oriented. There is no sun protection policy in place or guidance, or incentives given by teachers to parents or students.

The measure adopted by the students during the breaks for photoprotection is the search for the shade and the use of a cap, which is allowed in the breaks. UV radiation and its harms are subjects studied in the Science subject, only in the ninth year.

The teacher has a degree in Biology, has taught Science for 8 years, and reports participation in training in active teaching/learning methodologies, using instruments based on these methodologies in educational activities.

Sociodemographic and phenotypic characterization of the studied population

The population of participating students is 53% male and 47% female: the age ranges from 11 to 15 years, with an average of 14 years. 49.5% consider themselves white and 44%, brown, being a minority of blacks. The predominant family income is 1 to 3 minimum wages, and most parents have completed secondary school.

Regarding the risk factors for skin cancer: 35.48% consider their skin to be of a low phototype (phototypes 1 and 2); as for the eyes, light hair, and the presence of freckles, 10.75%, 20.43% and 11.82% have these characteristics, respectively.
As for the presence of more than 50 spots and spots larger than 1 cm, 7.52% and 13.27% responded positively; however, an important portion of students who did not answer or did not know how to answer is noteworthy, showing low concern with the issue.

As for risky behavior, more than 60% report daily sun exposure and more than 70% report at least one sunburn episode.

As for the family history of skin cancer, only 11.82% report a positive history, and more than 30% did not know how to answer.

As for the family history of cancer, a larger proportion of 20% also did not know or did not respond, which again shows low awareness of the topic.

Quantitative Results

In total, 32 students answered the questionnaire Q2-pre, Q2-post and Q3, completing 100% the proposal of the educational program.

Presentation of comparative results, under quantitative analysis, of the questionnaires of knowledge and attitudes Q2 pre-intervention and post-intervention, showing the mean and median (Tables 2-4).

Analysis of the Educational Program Satisfaction Questionnaire (Table 5).

4. Discussion

Regarding the quantitative data of photoprotective attitudes, there was no statistically significant change due to a bias: the educational program was developed in the months of the spring and students did not go through the summer after the program, so that it was possible to compare this behavior.

Regarding the qualitative responses to the attitude’s questionnaire, there was statistical significance for question number four, which demonstrates that the educational program sensitized 33.4% of students to the use of sunscreen, even if rarely.

Table 2. Statistical analysis of Q2 attitudes questionnaire, quantitative answers.

| Questions                                                                 | Questionnaire | Probability |
|---------------------------------------------------------------------------|---------------|-------------|
| 1) During the summer, how much time, on average, do you spend sunbathing, | Average       | Median      | Average | Median | 0.677 |
|  per day, from Monday to Friday?                                          | 1.55^1        | 1.00        | 1.68    | 1.00    |       |
| 2) During the summer, how much time, on average, do you spend             | 1.59          | 1.00        | 1.23    | 1.00    | 0.401 |
|  sunbathing each day during weekends (Saturday and Sunday)?              |               |             |         |         |       |
| 3) In the last 12 months, how many times did you blush or burn from the   | 1.56^2        | 1.00        | 1.43    | 1.00    | 0.612 |
|  sun for a day or more?                                                   |               |             |         |         |       |

^1The numbers represent the quantity in hours; ^2Number of excessive exposures to the sun.
Table 3. Statistical analysis of Q2 attitudes questionnaire, qualitative answers.

| Answer | Before | | | After | | | Probability |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | Fi | Fp | Total | Fi | Fp | Total | |
| 4) How often, during a week, do you use sunscreen? | | | | | | | |
| Never | 21 | 67.7 | 32 | 10 | 32.3 | 31 | 0.008 |
| Rarely | 7 | 33.3 | 32 | 14 | 66.7 | 31 | 0.050 |
| Sometimes | 2 | 33.3 | 32 | 4 | 66.7 | 31 | 0.368 |
| Often | 2 | 50.0 | 32 | 2 | 50.0 | 31 | 0.974 |
| Always | 0 | 0 | 32 | 1 | 100.0 | 31 | 0.306 |
| 5) How often do you use a sleeve shirt to cover your shoulders and arms? | | | | | | | |
| Never | 9 | 56.3 | 32 | 7 | 43.8 | 29 | 0.724 |
| Rarely | 5 | 45.5 | 32 | 6 | 54.6 | 29 | 0.607 |
| Sometimes | 3 | 50.0 | 32 | 3 | 50.0 | 29 | 0.899 |
| Often | 11 | 55.0 | 32 | 9 | 45.0 | 29 | 0.781 |
| Always | 4 | 50.0 | 32 | 4 | 50.0 | 29 | 0.881 |
| 6) How often do you wear a hat or cap? | | | | | | | |
| Never | 25 | 49.0 | 32 | 26 | 51.0 | 31 | 0.562 |
| Rarely | 6 | 54.6 | 32 | 5 | 45.5 | 31 | 0.784 |
| Sometimes | 1 | 100.0 | 32 | 0 | 0.0 | 31 | 0.321 |
| Often | 0 | 0.0 | 32 | 0 | 0.0 | 31 | - |
| Always | 0 | 0.0 | 32 | 0 | 0.0 | 31 | - |
| 7) How often do you use parasols/umbrellas or seek shelter in the shade? | | | | | | | |
| Never | 20 | 50.0 | 33 | 20 | 50.0 | 31 | 0.747 |
| Rarely | 7 | 58.3 | 33 | 5 | 41.7 | 31 | 0.602 |
| Sometimes | 0 | 0.0 | 33 | 1 | 100.0 | 31 | 0.298 |
| Often | 5 | 71.4 | 33 | 2 | 28.6 | 31 | 0.265 |
| Always | 1 | 25.0 | 33 | 3 | 75.0 | 31 | 0.272 |
| 8) How often do you wear sunglasses? | | | | | | | |
| Never | 26 | 50.0 | 32 | 26 | 50.0 | 31 | 0.784 |
| Rarely | 5 | 50.0 | 32 | 5 | 50.0 | 31 | 0.956 |
| Sometimes | 1 | 100.0 | 32 | 0 | 0.0 | 31 | 0.321 |
| Often | 0 | 0.0 | 32 | 0 | 0.0 | 31 | - |
| Always | 0 | 0.0 | 32 | 0 | 0.0 | 31 | - |
| 9) How often do you expose yourself to the sun to get a tan? | | | | | | | |
| Never | 26 | 56.5 | 31 | 20 | 43.5 | 31 | 0.082 |
| Rarely | 4 | 26.7 | 31 | 11 | 73.3 | 31 | 0.038 |
| Sometimes | 1 | 100.0 | 31 | 0 | 0.0 | 31 | - |
| Often | 0 | 0.0 | 31 | 0 | 0.0 | 31 | - |
| Always | 0 | 0.0 | 31 | 0 | 0.0 | 31 | - |
Continued

10) What is the natural color of your skin and what is its capacity to tan?

| Color         | Before | After |
|---------------|--------|-------|
| Extr. Pale    |        |       |
| Pale          |        |       |
| Average       |        |       |
| Light brown   |        |       |
| Dark brown    |        |       |

Note: in question 10, the answers were summarized.

Table 4. Statistical analysis of Q2 knowledge questionnaire.

| Answer | Before | After |
|--------|--------|-------|
|        | Fi     | Fp    | Total | Fi     | Fp    | Total | Probability |
| 1) Is it healthy to sunbathe? |        |       |       |        |       |       |             |
| They do not know | 12 | 44.4 | 31 | 15 | 55.6 | 28 | 0.252 |             |
| Yes or No | 10 | 66.7 | 19 | 5 | 33.3 | 13 | 0.430 |             |
| 2) Even on cloudy days, is it possible to get sunburnt? |        |       |       |        |       |       |             |
| They do not know | 7 | 50.0 | 31 | 7 | 50.0 | 31 | 1.000 |             |
| Yes or No | 19 | 48.7 | 24 | 20 | 51.3 | 24 | 0.712 |             |
| 3) Can glass protect us from the sun’s rays? |        |       |       |        |       |       |             |
| They do not know | 9 | 50.0 | 31 | 9 | 50.0 | 31 | 1.000 |             |
| Yes or No | 4 | 100.0 | 22 | 0 | 0.0 | 22 | 0.036 |             |
| 4) Even on days when the temperature is not so high, am I at risk of burning myself? |        |       |       |        |       |       |             |
| They do not know | 9 | 56.3 | 31 | 7 | 43.7 | 31 | 0.562 |             |
| Yes or No | 20 | 47.6 | 22 | 22 | 52.4 | 24 | 0.927 |             |
| 5) In winter, is it possible to get sunburnt? |        |       |       |        |       |       |             |
| They do not know | 13 | 50.0 | 31 | 13 | 50.0 | 30 | 0.912 |             |
| Yes or No | 11 | 47.8 | 18 | 12 | 52.2 | 17 | 0.556 |             |
| 6) What can we do to protect ourselves from the sun? |        |       |       |        |       |       |             |
| Wear sunscreen | 9 | 40.9 | 31 | 13 | 59.1 | 31 | 0.288 |             |
| Avoid sun exposure | 4 | 66.7 | 31 | 2 | 33.3 | 31 | 0.390 |             |
| Wear long clothes | 0 | 0.0 | 31 | 1 | 100.0 | 31 | 0.313 |             |
| All options | 18 | 54.6 | 31 | 15 | 45.4 | 31 | 0.445 |             |
| 7) What is the riskiest time for sun exposure? |        |       |       |        |       |       |             |
| Between 10 am and 4 pm | 25 | 58.1 | 31 | 18 | 41.9 | 30 | 0.077 |             |
| Until 12 a.m. and after 6 p.m. | 5 | 35.7 | 31 | 9 | 64.3 | 30 | 0.198 |             |
| Between 8 a.m. and 6 p.m. | 0 | 0.0 | 31 | 2 | 100.0 | 30 | 0.144 |             |
| Before 9 a.m. and after 4 p.m. | 1 | 50.0 | 31 | 1 | 50.0 | 30 | 0.981 |             |
| 8) What is the benefit of protecting yourself from the sun? |        |       |       |        |       |       |             |
| Not feeling thirsty | 0 | 0.0 | 31 | 0 | 0.0 | 31 | - |             |
| Avoid tanning too much | 9 | 47.4 | 31 | 10 | 52.6 | 31 | 0.783 |             |
9) And what is the main problem if we don’t protect ourselves from the sun?

| Problem                  | Yes | No |
|--------------------------|-----|----|
| Skin cancer              | 14  | 31 |
| Burns                    | 3   | 31 |
| Aging                    | 1   | 31 |
| All options              | 13  | 31 |

10) What is the best sunscreen and the best way to use it?

| Sunscreen Choice                      | Yes | No |
|---------------------------------------|-----|----|
| SPF30, every 2 hours                  | 23  | 31 |
| Any SPF, once a day                   | 4   | 31 |
| SPF15, twice a day                    | 2   | 31 |
| SPF50, once a day                     | 2   | 31 |

11) What is the correct amount of sunscreen to use?

| Amount Amount | Yes | No |
|---------------|-----|----|
| 16 tablespoons (tbsp) | 14  | 31 |
| 10 tablespoons (tbsp) | 0   | 31 |
| 1 teaspoon face, 3 tbsp body | 15  | 31 |
| 1 tablespoon face | 2   | 31 |

12) Is artificial tanning a safe way to tan and also protect your skin?

| Choice       | Yes | No |
|--------------|-----|----|
| They do not know | 12  | 31 |
| Yes or No    | 5   | 19 |

13) Should even people with dark brown and black skin protect themselves from the sun’s rays (ultraviolet radiation)?

| Choice       | Yes | No |
|--------------|-----|----|
| They do not know | 3   | 31 |
| Yes or No    | 26  | 28 |

14) I already burned a lot by the sun, but now I protect myself. I am free from the risk of having skin cancer

| Choice       | Yes | No |
|--------------|-----|----|
| They do not know | 8   | 31 |
| Yes or no    | 8   | 23 |

15) What are the most frequent signs of skin cancer?

| Sign                    | Yes | No |
|-------------------------|-----|----|
| High and shiny lesion   | 8   | 31 |
| Black spot that grows, changes | 8   | 31 |
| Wound that doesn’t heal | 6   | 31 |
| All options             | 9   | 31 |

16) What is the best way to avoid skin cancer?

| Choice                        | Yes | No |
|-------------------------------|-----|----|
| Protected sun exposure        | 26  | 32 |
| Avoid direct contact          | 1   | 32 |
| Proper nutrition              | 3   | 32 |
| There is no way               | 2   | 32 |

17) Why is protecting yourself from sun exposure important?

| Reason                        | Yes | No |
|-------------------------------|-----|----|
| Because the effect is cumulative | 21  | 31 |

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Continued

| Questions                                | I disagree | I neither agree nor disagree | I agree | Total |
|-------------------------------------------|------------|-------------------------------|---------|-------|
|                                            | Fi         | fp                            | Fi      | Fp    | fi    | Fp    | fi    | Fp    |
| 1) About the effectiveness of the methods used | 0          | 6.5                           | 16      | 51.6  | 15    | 48.4  | 31    | 100   |
| 2) Variety of materials that supported learning | 0          | 0.0                           | 10      | 32.3  | 21    | 67.7  | 31    | 100   |
| 3) The teaching materials were motivating | 2          | 6.5                           | 12      | 38.7  | 17    | 54.8  | 31    | 100   |
| 4) I had the opportunity to discuss ideas and concepts | 0          | 0.0                           | 2       | 6.5   | 29    | 93.5  | 31    | 100   |
| 5) Active participation                   | 4          | 12.9                          | 8       | 25.8  | 19    | 61.3  | 31    | 100   |
| 6) I felt at ease                         | 5          | 16.1                          | 6       | 19.4  | 20    | 64.5  | 31    | 100   |
| 7) I was able to expose my ideas          | 4          | 12.9                          | 16      | 51.6  | 11    | 35.5  | 31    | 100   |
| 8) Hears enough opportunity to understand the purpose of the activities | 0          | 0.0                           | 14      | 45.2  | 17    | 54.8  | 31    | 100   |
| 9) The objectives were clear and easy     | 3          | 9.7                           | 7       | 22.6  | 21    | 67.7  | 31    | 100   |

Another statistically significant change was related to sun exposure for intentional tanning. There was a decrease in the number of students who responded that they never intentionally exposed themselves to the sun, and an increase in students who responded to intentionally sunbathing rarely. This symbolizes students’ awareness of sun exposure, who have come to consider the answer “Never” as unlikely.

As for knowledge, the educational program caused statistically significant changes in two questions: question three, about glass photoprotection, which obtained 100% of success and understanding to answer correctly, and question eleven,
whose percentage dropped from 73% to 26% of students who wrongly judged the correct amount of sunscreen. This shows that the educational program was assertive for this case.

Regarding the satisfaction questionnaire, more than 93% of students considered having the opportunity to discuss ideas and concepts during the educational program, which is an important matter in active teaching/learning methodologies, since the rescue of prior knowledge makes it possible to insert new concepts and knowledge reconstruction, which makes learning meaningful (Sousa et al., 2012; Sociedade Brasileira de Dermatologia, 2017b; Nova Zelândia, 2019; Likert, 1932).

The variety of materials presented, and the motivation generated were also items approved by more than half of the students, which effectively contributes to changing behavior and developing new habits (Sousa et al., 2012; Sociedade Brasileira de Dermatologia, 2017b; Nova Zelândia, 2019; Likert, 1932).

The active participation of students and the supportive environment were judged positively by more than 60% of students.

And the understanding of the objectives of the activities and their clarity and ease, were judged to be sufficient in 54.8% and 67.7%, respectively.

The students had difficulty in giving their opinion on: “The effectiveness of the methods”, “space to present their own ideas” and “opportunity to clarify the objectives of the activities”. In view of the satisfactory evaluation of the other items, it was considered that in this case, possibly, the questions were not very objective, generating difficulty in understanding.

5. Conclusion

We concluded that the educational program through active learning methodologies on skin cancer prevention sensitized students, promoted the use of sunscreen and the acquisition of new knowledge about photoprotection: the correct amount for applying sunscreen and the fact that glass does not protect against UV radiation.

The possibility of significant knowledge construction, based on interaction with peers and the teacher, using triggers, allows a positive influence on the development of healthy behavior (Alonso et al., 2020; Souza et al., 2018).

The strategies used in the educational program were evaluated as satisfactory by the students, promoting an opportunity for the construction of new knowledge, in a participatory way, in a welcoming environment, through motivating materials, following the precepts of active learning methods (Thomson, 2006; Guy et al., 2016; Lima, 2017); in addition to enabling greater student involvement and integration with the topic, raising awareness of new attitudes and the development of healthy habits in the prevention of skin cancer.

The potential of the educational program to provide knowledge and motivate the change of habits is a good justification for the inclusion of the proposed theme in the curriculum of schools in the city, or even in the nationwide, so that
more engaged teachers and students could improve the program and obtain better results.

**Conflicts of Interest**

The authors declare no conflicts of interest regarding the publication of this paper.

**References**

Almeida, A. C. M. (2020). *E colaboradores-Braz. J. Nat. Sci. importância da fotoeducação na prevenção do câncer de pele.*

Alonso, F., Gonzalez-Marin, A., Esteban, C., & Useche, S. A. (2020). Behavioral Health at School: Do Three Competences in Road Safety Education Impact the Protective Road Behaviors of Spanish Children? *International Journal of Environmental Research and Public Health, 17*, 935. [https://doi.org/10.3390/ijerph17030935](https://doi.org/10.3390/ijerph17030935)

Bastuji-Garin, S., Grob, J. J., Grognard, C., Grosjean, F., & Guillaume, J. C. (1999). Melanoma Prevention: Evaluation of a Health Education Campaign for Primary Schools. *Archives of Dermatology, 135*, 936-940. [https://doi.org/10.1001/archderm.135.8.936](https://doi.org/10.1001/archderm.135.8.936)

Bataille, V. (2013). Sun Exposure, Sunbeds and Sunscreens and Melanoma. What Are the Controversies? *Current Oncology Reports, 15*, 526-532. [https://doi.org/10.1007/s11912-013-0342-4](https://doi.org/10.1007/s11912-013-0342-4)

Brasil. Ministerio da Saude, Secretaria de Atenção a Saude, Instituto Nacional de Câncer (2010). *Coordenação Geral de Ações Estratégicas. Coordenação de Prevenção e Vigilância. Estimativa: Incidência de Câncer no Brasil.* Rio de Janeiro.

Brasil. Centro de Previsão do Tempo e Estudos Climáticos (2019). *Instituto Nacional de Pesquisas Espaciais.* [http://tempo.cptec.inpe.br](http://tempo.cptec.inpe.br)

Brasil. Instituto Melanoma Brasil (2013). *Foz do Iguaçu (PR): Instituto Melanoma Brasil.* [http://www.melanomabrasil.org/nossa-historia](http://www.melanomabrasil.org/nossa-historia)

Brasil. Youtube. [https://www.youtube.com](https://www.youtube.com)

Buller, D. B., Cokkinides, V., Hall, H. I., Hartman, A. M., Saraiya, M., Miller, E. et al. (2011). Prevalence of Sunburn, Sun Protection, and Indoor Tanning Behaviors among Americans: Review from National Surveys and Case Studies of 3 States. *Journal of the American Academy of Dermatology, 65*, S114-S123. [https://doi.org/10.1016/j.jaad.2011.05.033](https://doi.org/10.1016/j.jaad.2011.05.033)

Chen, A. C., Halliday, G. M., & Damian, D. L. (2013). Non-Melanoma Skin Cancer: Carcinogenesis and Chemoprevention. *Pathology, 45*, 331-341. [https://doi.org/10.1097/PAT.0b013e32835f515c](https://doi.org/10.1097/PAT.0b013e32835f515c)

Chinem, V. P., & Miot, H. A. (2011). Epidemiology of Basal Cell Carcinoma. *Anais Brasileiros de Dermatologia, 86*, 292-305. [https://doi.org/10.1590/S0365-0326-2011000300013](https://doi.org/10.1590/S0365-0326-2011000300013)

Conselho Nacional de Saúde (Brasil) (2012). *Resolução nº 466, de 12 de dezembro de 2012.* Brasilia. [http://www.conselho.saude.gov.br/web_comissoes/conep/index.html](http://www.conselho.saude.gov.br/web_comissoes/conep/index.html)

Eppinger, B., Walter, M., Heekeren, H. R., & Li, S. C. (2013). Of Goals and Habits: Age-Related and Individual Differences in Goal-Directed Decision-Making. *Frontiers in Neuroscience, 7*, 253. [https://doi.org/10.3389/fnins.2013.00253](https://doi.org/10.3389/fnins.2013.00253)

Fitzpatrick, T. B. (1988). The Validity and Practicality of Sun-Reactive Skin Types I through. *Archives of Dermatology, 124*, 869-871. [https://doi.org/10.1001/archderm.124.6.869](https://doi.org/10.1001/archderm.124.6.869)

Glanz, K., Saraiya, M., & Wechsler, H. (2002). Guidelines for School Programs to Prevent
Skin Cancer. *MMWR Recommendations and Reports, 51*, 1-18.

GLOBOCAN (2018). *Graph Production: Global Cancer Observatory*. International Agency for Research on Cancer. [http://gco.iarc.fr](http://gco.iarc.fr)

Guimarães, S. E. (2003). *Avaliação do estilo motivacional do professor: Adaptação e validação de um instrumento*. Tese (Doutorado em Educação) Programa de Pós-Graduação em Educação, Campinas: Universidade Estadual de Campinas.

Guy, G. P., Holman, D. M., & Watson, M. (2016). The Important Role of Schools in the Prevention of Skin Cancer. *JAMA Dermatology, 152*, 1083-1084. [https://doi.org/10.1001/jamadermatol.2016.3453](https://doi.org/10.1001/jamadermatol.2016.3453)

Ilyas, M., Costello, C. M., Zhang, N., & Sharma, A. (2017). The Role of the Ugly Duckling Sign in Patient Education. *Journal of the American Academy of Dermatology, 77*, 1088-1095. [https://doi.org/10.1016/j.jaad.2017.06.152](https://doi.org/10.1016/j.jaad.2017.06.152)

Instituto Nacional do Câncer (INCA) (2009). Tendências Regionais da Mortalidade por Câncer no Estado de São Paulo 2000 a 2010/Mendes JDV e Cecílio MAPM. *BEPA 2012, 9*, 24-45.

Instituto Nacional do Câncer [homepage da internet] (2020). *Câncer de pele e melanoma*. [https://www.inca.gov.br/sites/ufu.sti.inca.local/files//media/document//estimativa-2020-incidencia-de-cancer-no-brasil.pdf](https://www.inca.gov.br/sites/ufu.sti.inca.local/files//media/document//estimativa-2020-incidencia-de-cancer-no-brasil.pdf)

Jha, D., Jha, S., Ghosh, S., Smylie, M., & Taher, M. J. (2017). Sun-Smart Practices Amongst School Students (Grades 5, 7, and 9) in Alberta, Canada. *Journal of Cutaneous Medicine and Surgery, 21*, 137-144. [https://doi.org/10.1177/1203475417692574](https://doi.org/10.1177/1203475417692574)

Kouzes, E., Thompson, C., Herington, C., & Helzer, L. (2017). Sun Smart Schools Nevada: Increasing Knowledge Among School Children About Ultraviolet Radiation. *Preventing Chronic Disease, 14*, E125. [https://doi.org/10.5888/pcd14.170202](https://doi.org/10.5888/pcd14.170202)

Likert, R. (1932). A Technique for the Measurement of Attitudes. *Archives in Psychology, 22*, 1-55.

Lima, V. V. (2017). Espiral construtivista: Uma metodologia ativa de ensino-aprendizagem. *Interface (Botucatu), 21*, 421-434. [https://doi.org/10.1590/1807-57622016.0316](https://doi.org/10.1590/1807-57622016.0316)

Lin, J. S., Eder, M., & Weinmann, S. (2011). Behavioral Counseling to Prevent Skin Cancer: A Systematic Review for the U.S. Preventive Services Task Force. *Annals of Internal Medicine, 154*, 190-201. [https://doi.org/10.7326/0003-4819-154-3-201102010-00009](https://doi.org/10.7326/0003-4819-154-3-201102010-00009)

Lomas, A., Leonardi-Bee, J., & Bath-Hextall, F. (2012). A Systematic Review of Worldwide Incidence of Nonmelanoma Skin Cancer. *British Journal of Dermatology, 166*, 1069-1080. [https://doi.org/10.1111/j.1365-2133.2012.10830.x](https://doi.org/10.1111/j.1365-2133.2012.10830.x)

Lower, T., Girgis, A., & Sanson-Fisher, R. (1998). The Prevalence and Predictors of Solar Protection Use among Adolescents. *Preventive Medicine, 27*, 391-399. [https://doi.org/10.1006/pmed.1998.0309](https://doi.org/10.1006/pmed.1998.0309)

Martinez, M. A. R., Francisco, G., Cabral, L. S., Ruiz, I. R. G., & Neto, C. F. (2006). Genética molecular aplicada ao câncer cutâneo não melanoma. *Anais Brasileiros de Dermatologia, 81*, 405-419. [https://doi.org/10.1590/S0365-05962006000500003](https://doi.org/10.1590/S0365-05962006000500003)

Nilsen, L. T., Hannevik, M., & Veierød, M. B. (2016). Ultraviolet Exposure from Indoor Tanning Devices: A Systematic Review. *British Journal of Dermatology, 174*, 730-740. [https://doi.org/10.1111/bjd.14388](https://doi.org/10.1111/bjd.14388)

Nova Zelândia (2019). *SunSmartSchool*. CancerSociety. [http://www.sunsmartschools.co.nz](http://www.sunsmartschools.co.nz)

Paho.org (2018). *Folha Informativa Câncer*. [https://www.paho.org/bra/index.php?option=com_content&view=article&id=5588:folha-informativa-cancer&Itemid=1094](https://www.paho.org/bra/index.php?option=com_content&view=article&id=5588:folha-informativa-cancer&Itemid=1094)
Reynolds, K. D., Blaum, J. M., Jester, P. M., Weiss, H., Soong, S. J., & Diclemente, R. J. (1996). Predictors of Sun Exposure in Adolescents in a Southeastern U.S. Population. *Journal of Adolescent Health, 19*, 409-415. https://doi.org/10.1016/S1054-139X(96)00050-X

Ribeiro, S., Glass, D., & Bataille, V. (2016). Genetic Epidemiology of Melanoma. *European Journal of Dermatology, 26*, 335-339. https://doi.org/10.1684/ejd.2016.2787

Rocha, C. R. M., Tronco, A., Borba, F. W., Lunelli, J., Lavratti, R. M., & Tonial, F. (2018). Fotoexposição: Hábitos e conhecimentos de estudantes de Medicina. *Revista Brasileira de Medicina Saúde, 22*, 149-154. https://doi.org/10.4034/RBCS.2018.22.02.08

Rodriguez-Zamorano, P., Puebla-Tornero, L., Martín-Santos, L. M., Román-Villaizán, M. L., & Guerra-Tapia, A. (2018). Estudio transversal sobre la repercusion de la informacion educativa en los hábitos de fotoprotección tópica en estudiantes de medicina. *Semergen, 28*. https://doi.org/10.1016/j.semerg.2018.02.004

Sampaio, S. A. P., & Rivitti, E. A. (2018). *Dermatologia.*

SAS Institute (2018). *SAS® University Edition 9.4.* Cary, NC: SAS Institute Inc.

Schalka, S., Steiner, D., Ravelli, F. N., Steiner, T., Terena, A. C., Marçon, C. R. et al. (2014). Brazilian Consensus on Photoprotection. *Anais Brasileiros de Dermatologia, 89*, 1-74. https://doi.org/10.1590/abd1806-4841.20143971

Simmons, R. A., Cosgrove, S. C., Romney, M. C., Plumb, J. D., Brawer, R. O., Gonzalez, E. T. et al. (2017). Health Literacy: Cancer Prevention Strategies for Early Adults. *American Journal of Preventive Medicine, 53*, S73-S77. https://doi.org/10.1016/j.amepre.2017.03.016

Sociedade Brasileira de Dermatologia (2017a). *Calculadora do Risco de câncer de pele.* Rio de Janeiro: SBD. http://www.sbd.org.br/dezembroLaranja/calculadora

Sociedade Brasileira de Dermatologia (2017b). *Cuidados com o sol na infância. Pequeno manual de fotoproteção.* Rio de Janeiro: Sociedade Brasileira de Dermatologia. http://docplayer.com.br/storage/83/88830913/1615598578/wTmngGhFV2dTQ35a9aXEYQ/88830913.pdf

Sousa, A. F. M., Nogueira, J. A. D., & Rezende, A. L. G. (2012). Estratégias de capacitação de professores do ensino fundamental em atividade física e alimentação saudável. *Motriz, Rio Claro, 18*, 581-589. https://doi.org/10.1590/S1980-65742012000300018

Souza, E. F., Silva, A. G., & Silva, A. I. (2018). Active Methodologies for Graduation in Nursing: Focus on the Health Care of Older Adults. *Revista Brasileira de Enfermagem, 71*, 920-924. https://doi.org/10.1590/0034-7167-2017-0150

Stölzel, F., Seidel, N., Uhmann, S., Baumann, M., Berth, H., Hoyer, J. et al. (2014). Be Smart against Cancer! A School-Based Program Covering Cancer-Related Risk Behavior. *BMC Public Health, 14, 392*. https://doi.org/10.1186/1471-2458-14-392

Szklo, A. S., Almeida, L. M., Figueiredo, V., Lozana, J. A., Mendonça, G. A. S., Moura, L. et al. (2007). Comportamento relativo à exposição e proteção solar na população de 15 anos ou mais de 15 capitais brasileiras e Distrito Federal, 2002-2003. *Cadernos de Saúde Pública, 23*, 823-834. https://doi.org/10.1590/S0102-311X2007000400010

Thomson, J. A. (2006). Issues in Safety Education Interventions. *Injury Prevention, 12*, 138-139. https://doi.org/10.1136/ip.2006.012625

Weyers, W. (2012). The "Epidemic" of Melanoma between Under and Over-Diagnosis. *Journal of Cutaneous Pathology, 39*, 9-16. https://doi.org/10.1111/j.1600-0560.2011.01831.x