

The Importance of Skin Health Promotion for Children: Care with Makeup Use and Skin Cancer Prevention

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Abstract

Background: Numerous pathogenic complications affect the skin and are preventable, such as skin cancer, microbial diseases, dermal irritations, and anaphylaxis. In this context, the correct use of skin products, including sunscreens and child makeup, is important for promoting skin health and preventing adverse health conditions. **Objective:** This study aimed to use educational and playful activities to promote skin health for students. **Methods:** This project was developed in a municipal elementary school (Rio Grande do Sul State, Brazil). The interventions were divided into three moments. In the first day, a questionnaire was applied to find out the students' previous knowledge about photoprotection. On the second day, an intervention lecture was held addressing issues related to photoprotection and the use of makeup. Finally, we played educational and ludic games and after, the questionnaire was reapplied. This was done to evaluate these actions' effectiveness regarding photoprotection and record their habits by applying a structured questionnaire at the beginning and end of the activities. **Results:** Students received positively and interacted significantly during all activities performed. Regarding the impact of this study, we observed that ten times more students considered using sunscreen as something important at the end of the project, as only 8.16% of participants knew what skin cancer was at the beginning of the experiment. After the educational activities, this number rose to 72.37%, and 92.86% of girls reported wearing makeup, with more than half being expired or unlabeled and only 21.6% being appropriate for child use. **Conclusion:** The measures demonstrated effectively improve students' level of information regarding skin cancer prevention and indicated that inappropriate habits concerning makeup use in childhood are quite common, demonstrating the importance of educational interventions for children, since can improve your health.

Keywords: photoprotection- education games- prevention- consciousness- solar radiation

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Introduction

The skin is the largest organ in the human body and has numerous physiological functions, one of the most important being its role as a protective barrier against external agents (Pereira and da Silva, 2016). By covering almost completely the structure of the body, skin is target of several diseases, which can be prevented. Serious illnesses such as skin cancer or skin irritations are caused by inappropriate substances or environmental causes and even avoided with preventive measures. Thus, active teaching methods enable the understanding and importance of preventive measures and healthy habits, especially in the early stages of life, which can lead to a reduction in the levels of such diseases (Lopes, 2019).

In Brazil, out of all the types of malignant tumors, skin cancer represents 30% of all cases; it is considered the most prevalent, with southern Brazil presenting one

of the highest incidence rates. In children, skin cancer occurs less frequently, but they are not free from acquiring skin cancer in childhood, as children are more exposed to the sun (Medina, 2018). Data from the National Cancer Institute show that Rio Grande do Sul State has an estimated rate of 5.71 cases of skin cancer for every 100,000 men and 4.74 cases for every 100,000 women, making it one of the highest rates in the country (Inca, 2019a; b; Anvisa, 2016). According to the Solar Atlas of Rio Grande do Sul in 2018, the microregions of Campanha (which includes the city of Uruguaiana) have the highest incidence of solar radiation in the entire state (Haag et al., 2018). Chronic exposure to ultraviolet radiation from the sun is cumulative and responsible for deleterious effects, damaging the genetic material by several mechanisms and increasing the chances of skin cancer (Mallet et al., 2014; Pires et al., 2017).

Most of life's sun exposure occurs in childhood, due to

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children being exposed to the sun more intensely, thereby making it very harmful, considering the cumulative detrimental effects of excessive radiation. Additionally, as people grow older, they find it more challenging to start consciously adopting healthier photoprotection habits (Criado et al., 2012). Therefore, education for the prevention of skin cancer and/or diseases related to skin health is still crucial in the initial stages of life (Criado et al., 2012; Pires et al., 2017). Prevention against solar radiation is indicated as the most effective way to prevent skin cancer, which includes exposure to the sun at appropriate times and the use of sunscreen that are currently available in a plethora of cosmetic products (Criado et al., 2012; Santos et al., 2018).

Regarding cosmetic products, mainly for facial use, makeup stands out, and Brazil is one of the largest markets globally for children's cosmetics (Anvisa, 2016). The National Sanitary Surveillance Agency (ANVISA) classified these cosmetic products as Grade II and are regulated in accordance with the RDC no. 15/2015 (Blume-Peytavi et al., 2012; Brasil, 2015), which provides the technical requirements (registration of personal hygiene products, cosmetics, perfumes, children's products, and other measures).

Given their intense interaction with each other and curiosity in exploring their environments, children are more susceptible to eye and skin infections, with greater chances of sharing cosmetic products and misusing products often aimed at adults, thus favoring allergic reactions (Anvisa, 2016; Lopes, 2019; Zirwas, 2019). Literature data show high rates of inappropriate use of makeup by children (Rosvailier, 2015). These indices may be related to greater adhesion of children to social networks and easy access to the media (Nunes et al., 2016; Weber and Francisco-Maffezzoli, 2016; Ponte, 2018). Moreover, this market has been quickly gaining more followers, increasing the number of people who create channels in digital media, consequently propagating and encouraging makeup use. Given these aspects, health agencies and those responsible for children are more attentive to the topic since a wide range of brands targets their products at this population, although they generally do not indicate their contraindications (e.g., age groups for their use and the risks of inappropriate consumption) (Nunes et al., 2016; Zirwas, 2019).

In 2015, the World Health Organization (WHO) noted that coordinated action across all segments of society and at all levels is necessary to facilitate prevention policies and programs that empower individuals to make healthy choices (Opas, 2015). Considering that health promotion is vital, health education lectures have proven to be useful in increasing knowledge and effective in consolidating knowledge, such as educational games, especially for children (Batista and Dias, 2012; Pires et al., 2017; Viola and Bezerra, 2020); these methods can generate behavioral changes and direct individuals towards a healthier life (Bonfã et al., 2014; Velasques et al., 2016).

Most of the consolidation of learning and habits occurs in childhood, and skincare becomes essential to reduce the risk of preventable diseases that affect the skin. Moreover, developing educational activities to promote

skin health may be a strategy that helps prevent short- and long-term damage (Didier et al., 2014), in the same way that it was found in the study by Batista and Dias (2012) in which recreational activities performed in elementary school students, in different disciplines, increased student learning.

Given this scenario, in which children are a spreader of knowledge and the Rio Grande do Sul state have high incidence of solar radiation, this study aimed to assess the knowledge and habits of a group of children regarding skin health through educational actions aimed at promoting the theme and quantifying the effects of the activities performed using questionnaires and an evaluation of makeup used by the participants.

Materials and Methods

Inclusion and exclusion criteria

This project was developed in a Municipal Elementary School of Uruguaiiana (Rio Grande do Sul State, Brazil), with three fourth-year classes and 81 students aged between 9 and 11 years old.

A consent form was sent to the parents or guardians, so that they could authorize the children to participate in the project, and thus they were included. Students who were not authorized by their parents were withdrawn from the study.

Description of the activities performed

This study was divided into three moments. At the first meeting, the students received general information about the study and the informed consent form as per Resolution No. 466 (Saúde, 2012), which was sent to the parents, who authorized the students' participation in this project that had been previously approved by the Research Ethics Committee (UNIPAMPA no. 045/2011). A questionnaire, previously validated, was then delivered with several questions related to skin health, with the central points being skin cancer prevention and the proper use of makeup. The same questionnaire was applied on the last day of the study to verify the children's prior knowledge and compare it after our intervention. The questionnaire consisted of 22 multiple-choice questions regarding phenotypic information, previous experiences, knowledge, behavior, and activities related to the theme.

In the second moment (on the following day), an educational lecture was held with the topics covered in the questionnaire questions. The topics covered in this meeting were: (1) What is solar radiation and its effects on the skin; (2) Skin cancer, its risk factors, ways to identify possible signs of its presence, and how to act; (3) Meaning, importance, and how to proceed with photoprotection; (4) Skincare; (5) Children's cosmetics and their proper use, including topical sunscreens and makeup for this audience. There were practical demonstrations of correctly using sunscreens and makeup with a sun protection factor. Plastic bags were also distributed for the participating students to bring the makeup they typically use from their homes. The researchers evaluated these products in the next meeting according to an analysis script and returned them to the owners on the same day (Table 4).

On the third day, educational games were applied to the students, which had been previously prepared by the researchers and covered the topics highlighted above to consolidate knowledge and clarify any remaining doubts. Each class was divided into groups of 6 students, according to their affinity, and the participants were placed in a clockwise rotation system, approximately 20 minutes each game.

Games applied

The following games were developed and applied

Memory game

thirty cards with drawings (fifteen pairs) are randomly placed face down on a flat surface with the players around them. Each player must turn over two cards and attempt to find the pairs that correspond to each other. If they do so successfully, they are allowed to play once again and turn over two more cards; if not, it is the next player's turn, and the cards previously turned over must return to their place of origin. The game is over when there are no cards left. The cards, in addition to the images used in the presentation, contained phrases to help the players remember information such as: "Do not share makeup," "Use sunscreen," and "Beware of skin cancer."

Crossword puzzle

students must find and circle words in a space with mixed letters; these are specific words requested in the statement, such as photoprotection, allergy, and skin cancer.

Trail game

A board game was created; it contained squares that formed a path to a finish line, and each square contained a question. Each player must answer the question correctly in order to move the number of squares rolled on a six-sided die. Examples of questions used in this activity include: "What time is it not recommended to be exposed to the sun?" and "What is done to prevent skin cancer?"

Dominoes

this game was made of sheets of paper cut into twenty-one small rectangles with two images, one on each side, with a total of seven different images. Players received seven rectangles (chips) and placed them, one at a time, connecting the equal ends at the ends of the ones already placed; if they cannot place their rectangle, they lose their turn. The player who had all his chips in the game ends the game. The images included sunscreen and children's makeup to make the dominoes.

Spot the difference (seven errors game)

two identical images are placed side by side; in one of them, there are seven objects that do not appear in the other image that must be found. Objects that promote and do not promote photoprotection are placed, and then only those that protect from the sun should be described.

Lastly, at the end of the third meeting, the same questionnaire of the first day was applied to compare the level of knowledge before and after the activities.

Statistical analysis

For statistical analyses, the Chi-square method of Mantel-Haenszel was applied using Excel software (Microsoft Corporation) and Student's t test to compare the questionnaires before and after the intervention, considering a significant difference when $p < 0.05$.

Results

General characteristics of the students

In all, 81 children participated, and only female students answered the survey regarding makeup use, representing 39 girls. The survey of the characteristics and phenotypic information of the participants showed that 51.85% were male and 48.15% were female, with a mean age of 9.38 ± 1.19 years; this and other information is listed in Table 1.

Evaluation of the students' habits and knowledge about skin cancer

Following the intake of data related to the phenotypic characteristics of the students, a questionnaire was applied to the target audience to assess the level of knowledge on the subject. The results before and after the methodological intervention are presented in Table 2. Important issues regarding skin health were addressed to the participants. In the initial questions related to etiology and knowledge about the pathology (Table 2), there was a significant ($p < 0.05$) and gradual increase by the participants after the use of active teaching methods on the subject.

When asked about the occurrence of skin cancer in their relatives, more than half (64%) of the students could not inform. After applying the teaching activities, almost all students ($p < 0.001$) knew how to answer about the occurrence of the pathology in family members.

Students were also asked about aspects related to

Table 1. Characteristics and Phenotypic Information of the Study Participants

Variable	No. (N=81)	Participants (%)
Gender		
Male	42	51.80
Female	39	48.15
Mean age (years)	9.38 ± 1.19	
Mean female gender	9.23 ± 0.47	
Mean male gender	9.54 ± 1.16	
Skin color (self-declared)		
White	50	61.73
Brown	24	29.63
Black	7	8.64
Eye Color		
Black	6	7.41
Brown	68	83.95
Green/Blue	7	8.64
Presence of freckles		
Yes	16	19.75
No	65	80.25

Table 2. Questionnaire Questions and Responses Applied to the Students about Photoprotection before and after the Educational Activities

Questions	Before	After	p-value
1 - Do you know what skin cancer is?			
(Yes)	8.16	72.37	0.001
2 - Do you know if any of your relatives have or have had skin cancer?			
(I don't know)	64.47	5.53	0.001
(Yes)	9.21	5.26	0.381
3 - Do you know what ultraviolet (UV) rays are?			
(Yes)	9.74	43.42	0.001
4 - Do you know what sunscreen is?			
(Yes)	5.53	14.47	0.015
5 - Do you think it's important to use sunscreen?			
(Yes)	6.84	69.74	0.001
6 - When should we use sunscreen?			
Only in the summer	47.37	4.47	0.001
I don't know	14.47	7.89	0.001
Always	6.32	31.58	0.001
7 - Do you use sunscreen often?			
(Yes)	6.84	17.11	0.04
8 - What is the best time to be exposed to the sun?			
Between 10 am and 3 pm	18.52	34.56	0.001
Before 10 am and after 4 pm	6.05	15.79	0.001
Indifferent	3.70	2.47	0.001
I don't know	47.37	4.21	0.001
9 - Do you think that wearing a hat and shirt protects you?			
(Yes)	51.32	75.00	0.01

topical sunscreen. Questions on what topical sunscreen is, its use, and habits of sunscreen use were raised (Table 2). Overall, the students' knowledge about sunscreen and sunscreen use increased substantially compared to the first application of the questionnaire. As for questions related

to sunscreen use habits, again, after the teaching activities, there was a significant increase regarding the importance of using sunscreen and the periods of use. However, before the intervention, only 6.84% of the students attested to the use of sunscreen.



Figure 1. (A) Children's participation during the presentation; (B) interactive presentation during the lecture; (C) educational activities; (D) demonstration of how to apply sunscreen; (E) interactive games.

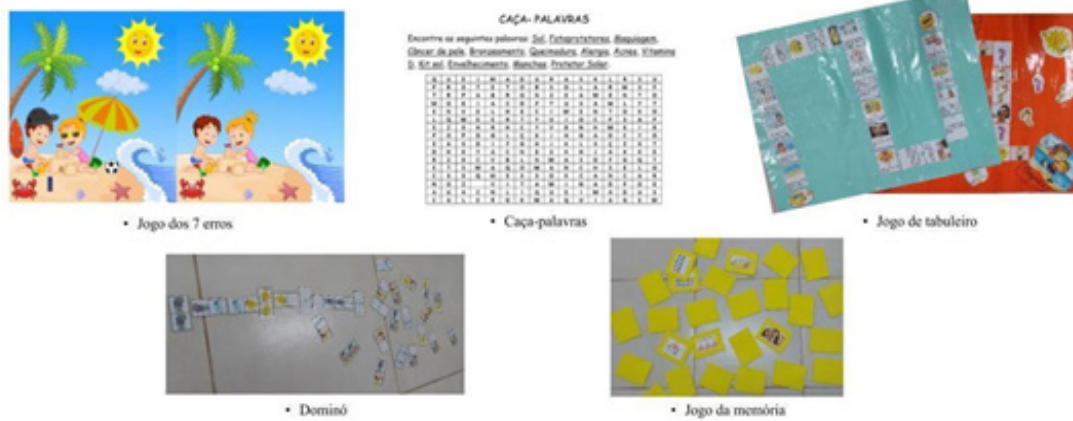


Figure 2. Educational Games Used in the Interactive Activities

Regarding the ideal time for sun exposure, most students (47.37%) did not know how to indicate the best time for sun exposure, which decreased considerably after the intervention with the teaching activities (4.21%). Additionally, there was a significant increase ($p < 0.001$) after the intervention concerning the best time to be exposed to the sun.

When asked whether hats and shirts protect against sun exposure, most students answered yes (51.32%). After the teaching activities, this number increased significantly ($p < 0.01$). This shows that the activities effectively taught that these garments represent a physical barrier against sun exposure.

Use of makeup by students

Out of the 42 students who answered the questionnaire, 93% have already used makeup; practically half (46.62%) of the children said that shared their makeup with a family member or friend (Question 7 - Table 3). Only 9.52% of the interviewees reported having already used expired makeup (Question 3 - Table 3). Nevertheless, over half (54.73%) responded that they do not usually throw their makeup away, leading to the possibility of a higher number of children who have used these products past their expiration date and are probably unaware of it.

Survey of the makeup used by the students

Considering that only 20 of the participants brought their makeup, these were evaluated in the study. Most of the products brought by the children were lipstick/gloss,

followed by eyeshadow, mascara, and eyeliner (Table 4); the first product proved to be the most used makeup product by the children who answered the questionnaire (Question 2 - Table 3), implying that this may be indeed the most popular product.

The expired products totaled 15.91%, representing an already worrying value, which may be masked among the 36.4% makeup that was unlabeled, thus considering the high rate of possible dermatological problems of these out-of-date products. Two of the eight mascaras evaluated were expired, indicating a high value since four of them did not have a label.

Only 21.6% of the cosmetics corresponded to products suitable for children, which is in line with the answers of Question 7 (Table 3), in which 46.62% of students said they use their mothers' makeup, indicating greater exposure to products intended for adults.

Discussion

We observed that children are important audience to this work on aspects of awareness, as they are curious and very participative, it increases the relevance of this propose. During all the research activities, the participating students showed interest in the issues addressed, discussing, and asking questions actively. Right at the beginning, when the children were presented to issues and games, they started to ask questions about the subject in several aspects, thereby showing interest and paying attention during the activities. After the first moment of



Figure 3. Examples of Slides and Themes Used in the Lecture

Table 3. Data Collection on the Use of Makeup (Done with Girls)

Questions	No. (N=42)	Responses (%)
1- Do you use some type of makeup?		
Yes	39	92.86
No	3	7.14
2- What makeup do you use?		
Lipstick	33	78.57
Nail polish	24	57.14
Lip gloss	22	52.38
Eye shadow	17	40.48
Mascara	13	30.95
Face powder	12	28.57
Foundation	11	26.19
Blush	10	23.81
Eyeliner	8	19.04
Concealer	7	16.67
3- Do you use or have you already used expired makeup?		
Yes	4	9.52
No	39	92.85
4- When using expired makeup, have you ever felt something different on your skin?		
Yes	4	9.52
No	25	59.52
5- What do you remember feeling when you used expired makeup?		
Watery eyes	2	4.76
Itchiness	4	9.52
Redness	1	2.38
Allergy	3	7.14
Herpes	0	0
Irritation	0	0
Rushes	1	2.38
Others	0	0
6- How often do you throw makeup away?		
Every 3 to 6 months	9	21.43
Every 6 months to 1 year	5	11.9
After over 1 year	3	7.14
I don't throw it away	23	54.76
7 - Whose makeup do you use?		
My mother's	20	46.62
My grandmother's	2	4.76
My sister's	3	7.14
My friend's	4	9.52

the presentation of the members and the objective of the study, a questionnaire was applied at the beginning and at the end of this project. The girls only answered the last part of the questionnaire, about habits related to makeup use. To verify the characteristics of the makeup products used by the children, a survey was carried out.

When asked about race, more than half of the children

self-reported to be white (Table 1), indicating that most students may be more susceptible to developing skin cancer in the future, and about 20% of students have freckles, which is another risk factor for developing skin cancer (Kyle et al., 2014). A similar study by Velasques et al. (2016) in Uruguaiana also demonstrated similar results to those presented herein; the authors observed a notable increase in the understanding of what ultraviolet radiation is, as well as skin cancer, after the teaching activities on the subject (Table 2). Thus, the positive impact on the knowledge of the etiology and the pathology itself can lead to preventive measures, which can prevent the onset of skin cancer.

According to Avero and Lucchese (2017), children are propagators of information, thereby confirming that this understanding is necessary and effective to increase the prevention of diseases caused by excessive and/or incorrect sun exposure. In our study, we verified exactly the information exposed above during the three days of the study, as the students took the questions to their relatives, thus having a direct impact on the consolidation of learning about skin cancer, which directly and indirectly affects numerous families.

A crucial question is about sunscreen, as it is one of the main ways to protect against skin cancer. This suggests that the teaching methods effectively taught about topical sunscreen, which is a preventive way for skin cancer. These findings are paramount since people diagnosed with skin cancer attest that they did not obtain enough information and did not use sunscreen during the different stages of their life cycle (Pires et al., 2017). Then, for places directly related to the high prevalence of skin cancer, as Rio Grande do Sul state, public policies can be implemented, mainly aimed at children and adolescents (populations that can generate a vector of knowledge for adults) to modify these cscenario (Inca, 2019a).

Before the children's participation in our work, they did not understand the optimal time to expose themselves to the sun, which changed after our intervention. Thus, our findings corroborate Bonfá et al. (2014), who conducted a similar study. Velasques et al. (2016) also reported similar results regarding sun exposure schedules by schoolchildren in rural area.

On the second moment of this work, after exposition about skin cancer prevention methods, half of the children already had some prior knowledge that hats and clothes protect from the sun, but after participating in our lecture, this percentage increased significantly (51% to 75%), showing that our activities effectively taught that garments represent a physical barrier against sun exposure. Paiva (2018) found similar evidence with elementary and high school students. Therefore, the use of teaching activities for students provided basic learning about fundamental preventive factors against skin cancer.

We have collected the make-up Receiving the cosmetics that the children usually use was crucial to compare what was answered in the questionnaire about the makeup and the real situation of this makeup part of their routines (Tables 3 and 4). This allowed us to identify and evaluate if they were children's products, within the expiration date, or with the identification label.

Table 4. Evaluation of Makeup According to the Participants

Type of makeup	Quantity	Coluna 1	Child-friendly	Coluna 2	Expired	Coluna 3	Invalid	Coluna 4
	No.	%	No.	%	No.	%	No.	%
Lipstick	50	56.8	10	20	3	6	16	32
Eye shadow	11	12.5	6	54.5	2	18.18	4	36.4
Mascara	8	9.1	0	0	2	25	4	50
Eyeliner	6	6.9	1	20	1	20	1	20
Nail polish	4	4.5	1	25	2	50	2	50
Blush	3	3.4	1	33.3	1	33.3	0	0
Face powder	2	2.3	0	0	1	50	2	100
Concealer	2	2.3	0	0	1	50	2	100
Foundation	1	1.2	0	0	1	100	1	100
Primer	1	1.2	0	0	0	0	0	0
Total	88	100	19	21.6	14	15.9	32	36.4

No., number; %, percentage

Almost all of the girls who answered the questionnaire said that they had already used some type of makeup. This is understandable, as Brazil has been gaining more notoriety in the children's cosmetics sector (Ponte, 2018). Regarding how the girls acquired their makeup, almost half said they shared it with a family member or friend (Question 7 - Table 3). This is alarming due to the risks of microbiological contamination and diseases that this act can cause, such as conjunctivitis and herpes and contamination by microorganisms that include *Klebsiella* spp., *Kocuria Kristinae* and *Aspergillus niger* (Macedo et al., 2020). The Brazilian Ministry of Health informs that it is essential to regularly check the expiration date of makeup, discard expired makeup and maintain preventive health measures, such as keeping the original packaging or recording the expiration date (Ministry of Health, 2016). Nevertheless, over half of the children responded that they do not usually throw their makeup away, leading to the possibility that a greater number of children who used these products out of date and are probably unaware of it, increase the risk of skin problems.

In a study conducted by Ponte (2018) with 1800 Brazilian children aged 6 to 16 years old, the authors observed that roughly 95% of those under 12 years old used lipstick, a value higher than the found in our study (over 56%), although it still represents the most used product, which may also be related to the lower age range of our respondents. The great variety and quantity of products used by children is understandable since, nowadays, children and young people are increasingly seeking self-affirmation to be part of groups, so it is increasingly common that they follow makeup channels or watch TV shows to keep up with makeup trends according to their idols (Nahar et al., 2014).

Considering the relationship between makeup and sun protection factor, Rocha Tunes (2017) reported that about 70% of respondents did not know that some type of lip protector should be used and therefore did not do it, and its importance was emphasized during our lecture. In the study by Santos et al. (2018), the authors demonstrated the importance of using sunscreen and any type of cosmetic according to their age group and within the expiration date

to avoid the potentiation of side effects.

Expired products that are not suitable for the age group of children can cause allergic skin reactions, as highlighted in the study carried out by Giacomel et al. (2013) in which showed that about 70% of people who used expired dermatological products had some kind of adverse reaction, where, as shown in Question 5 (Table 3), among the girls who knew they were using expired makeup, all of them had had at least one of the symptoms described, involving tearing, itchiness, redness, allergies, and acne. Two of the eight mascaras evaluated were expired, indicating a high value since four of them did not have a label, thus corroborating Ponte (2018), who showed that mascara was the most used type of cosmetic even after the expiration date.

As for the research participants, it was possible to notice how this age group is already extremely concerned about their appearance (Finato et al., 2013). General awareness of photoprotection and makeup (for each type of audience) should be better addressed by the media, public health sectors and even by parents, as the lack of knowledge of these two main topics can lead to more serious problems; this can also be evidenced considering the low amount of makeup suitable for children and within the expiration date reviewed in our project. Considering that allergic contact dermatitis is prevalent in adults, especially on the face (Zirwas, 2019), this potency may increase even more in the children due to their skin being more sensitive, which in addition to the already existing risks, is added to the use of products that are expired and/or out of their age group. Additionally, Zirwas (2019) also reported that the most common sources of eyelid contact dermatitis include shampoos, conditioners, facial cleansers, makeup remover, mascara, nail polish, acrylic nails, and makeup sponges, which are on our list of products that children have been shown to use.

Despite the promising data reported herein, it was possible to observe that, even in research on skin health among children (Zirwas, 2019), as in other studies in the literature, there is still a lack of data on the subject, more specifically on children, the use of cosmetics, guidelines in the media in a clear way, and skin cancer prevention.

As for the limitations of this work, we can mention the fact that the groups are different in terms of participation, which to reverse this point, we use aspects of their daily lives to encourage them to be more participatory. Regarding the makeup used by the girls, we found problems with the labels, as many of them no longer had the labels, or did not contain visible information, which made it difficult to assess the expiration date and their characteristics.

In summary, this paper demonstrated skin health is vital for enjoying a higher quality of life. Thus, this study made it possible to shed more light on the real situation of children exposed to factors that lead to skin cancer and habits that trigger diseases promoted by inappropriate makeup use. By quantifying and presenting such practices, our findings demonstrated that bad habits can put children's health at risk. The didactic activities employed were highly effective in several points when propagating guidelines for the prevention of skin diseases and can compose an intervention model to promote public health and preventive policies for children.

Author contribution statement

This study was designed and supervised by SEH with the intellectual aids of FEGT and FBC. Statistical analyses were done by FEGT and COP under the guidance and supervision of MGG. All practical activities at school were performed by FEGT, FBC, SHE, COP and KP. The preliminary manuscript was written by FEGT with the aids the FBC and KP, revised by MGG and finalized by SEH.

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Ethical Statement

The study protocol and objectives were fully described and introduced for the school and to the responsables for the students before they signed an informed written consent. The study procedures were ethically approved by the Research Ethics Committee (UNIPAMPA no. 045/2011).

Data Availability Statement

The datasets generated during and/or analyzed during

the current study are not publicly available due to ethical consideration but are available from the corresponding author on reasonable request.

Conflict of interest

The authors declare no conflict of interest.

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