

The Impact of Education on Adolescents' Sun Behavior: Experiences from Serbia

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SUMMARY

Introduction In Serbia, there have been no broad campaigns or educational programs focused on adolescents' sun protection.

Objective The aim of the study was to assess whether an educational program would have impact on changes of attitudes and sun-protective behaviors of high school students. More specific aim was to examine whether sex and age differences in sun behavior exists.

Methods Educational program was designed to provoke changes in attitudes towards sun protection and sun behavior. The investigation was carried out in Belgrade, Serbia in two educational cycles, during spring 2007 and 2008. Sixteen- and 17-year old high schools students were targeted and assessed before and after the educational intervention by means of self-report questionnaire designed for this study (about skin types and sun behavior). The students' attitudes towards sun protection and sun behavior before and after the educational intervention were compared and analyzed by the Pearson's chi-square test and logistic regression analyses. In the second educational cycle (2008) age and gender differences in sun behavior were analyzed.

Results Overall 3205 students in 2007, and 2155 students in 2008 year from 11 high schools participated. A statistically significant behavior change was observed for the use of sunglasses in 2007 – the number of students using them increased from 41.6 % to 45.6% ($p < 0.05$). There were no significant changes in other ways of protection i.e. sunscreen use, protective clothes or staying in shade.

Conclusion Educational program had an impact, but broader activities involving schools, local communities and media are needed for significant changes in sun behavior and attitude.

Keywords: adolescents; education; sun behavior; attitudes; health promotion; primary prevention

INTRODUCTION

There are about 3,500 new cases of skin cancer in Serbia every year, with about 300 cases of melanoma among them. According to the data, the number of skin cancer is almost the same as the number of colon cancers, which is assumed as the most frequent type of cancer in Serbia [1].

It is estimated that 80% of all skin cancers are caused by ultraviolet (UV) radiation regardless of the source of emission (sunlight or sunbed parlors) [2, 3]. Overexposure to UV radiation is a growing health concern for children due to environmental changes and cultural trends [4, 5]. Public education campaigns and media attention are very important for raising awareness of the health risks of UV exposure, and health based educational programs are considerably less successful at motivating behavioral change. However, education on sun protection, particularly in children and youth that usually spend a lot of time outdoors and are at the greatest risk of cumulative UV exposure, is one of the most important measure for prevention of skin cancers and other harmful effects of sun exposure [6, 7].

In Serbia, there were no broad campaigns or educational programs focused on sun protec-

tion so far. This study was designed to fulfill these needs and a specific educational program entitled "Sun bathing – yes or no?" was created. The goal of the program was to increase awareness among young people of harmfulness of excessive exposure to sun or artificial UV sources, to educate them on sun protection measures, motivate them to change their behavior and develop awareness of healthy environment importance. Particular attention was drawn to the problem of sunbeds and indoor sunlamps, since young people, particularly girls, are using them increasingly and there are no laws or regulations regarding the sunbed quality and use control in Serbia.

OBJECTIVE

Since it was the first survey of this kind in Serbia, the study intended to research the predominant skin type among adolescents, their accustomed attitude and behavior on the sun/sunbed parlors and to examine suggested one and/or create new, acceptable educational program. The objective of the study was to determine whether an educational program could have an impact on changes of attitudes and sun be-

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havior of high school students in Serbia. The specific aim was to assess age and gender differences in sun behavior.

METHODS

This multi-component, public health educational intervention was designed for high school students in Belgrade from 2007 to 2008. A cross-sectional study of the convenient sample of the first and second grade high-school students was carried out in randomly selected schools in the Belgrade region. Individual classes or the whole generations were included depending on the organizational possibilities in the schools.

Educational intervention comprised of a 90-minute lecture and a workshop which were prepared according to the relevant literature and authors' (SM) previous 10-year experience in sun protection education and health promotion conducted in various groups [6-11].

The lecture covered the following topics: (1) solar radiation – wavelengths, (2) damage of the ozone layer and its health-related effects, (3) beneficial effects of sunbathing, (4) adverse effects of UV exposure from sun and/or sunbeds, (5) proper behavior at the exposure, (6) UV radiation index, (7) sunscreens for beach and daily skin care products, (8) sunbeds – legislation, World Health Organization (WHO) recommendations, (9) artificial skin tanning products, and (10) post-exposure skin care and products.

In the workshop the students were given several everyday situations and asked to apply what they learnt from the lecture; for example, how to select beach sunscreen formulations to match their own skin type, how to protect themselves during the first days of stay at the seaside or when on skiing, what do they think of sunbeds – pro et contra, etc.

The participants were educated and trained in two cycles and their changes in attitude and sun behavior were assessed through a self-report multiple-choice questionnaire, at the beginning of the educational intervention (spring) and after a six-month period (autumn).

Results from the survey were entered into the database and analyzed, comparing answers in the spring and in the autumn in order to establish changes in attitudes and sun behaviors. Data from the behavior questionnaire were analyzed by the Chi-square test and logistic regression analyses. In the second cycle of educational intervention, age and gender differences in sun behavior were analyzed.

The sun protection health promotion intervention was implemented with the Serbian Society for Fight against Cancer and under the patronage of the Ministry of Health of the Republic of Serbia [12] and the Ministry of Education and Sport of the Republic of Serbia [13].

Statistical analysis

In this research, we calculated the sampling weights that took into consideration unequal probabilities of selection due to the design of sample and non-response. Data

management was conducted using Microsoft Access 2007 (Microsoft Corp.), and data analysis and variance estimation were conducted with SUDAAN software version 9.0 (Research Triangle Institute, NC). Using weighted corresponding estimates and SEs, the weighted differences are presented (changes in corresponding estimates) and the 95% confidence intervals (CIs) for the change in the estimates. Univariate chi-square, logistic regression, multivariate logistic regression and t-test analyses were performed using Stata software version 10.0 (StataCorp LP, TX). Analyses were performed to determine correlations between sun-protective behaviors, age and gender. Logistic and multivariate logistic regression analyses were done regarding individual sun-protective behavior included in the model.

RESULTS

In 11 randomly selected high schools in Belgrade, Serbia, a before-and-after (spring-autumn) survey on sun behavior completed 1,660 and 1,545 students in 2007, and 1,138 and 1,017 students in 2008, respectively.

Most of the participants in 2007 were born in 1991 (48%) or 1990 (38%). Those assessed in 2008 were born mostly in 1992 (46%) and 1991 (33%). The profile of the participants was as follows: brown hair (about 55%), brown eyes (46%), skin that moderately burns and moderately tans or rarely burns and easily tans (48% and 44%, respectively). The majority of the students (between 40 and 50% for both years) spend 30 to 50% of their free time outdoors. Only 30% of students try to avoid sun exposure i.e. walks, sports activities or sunbathing in critical hours around noon. However, during summer, more than half of the students (around 55%) are taking care in exposing themselves to the sun gradually and prevent sunburns.

Trends in the prevalence of sun protection behavior practices, sunburn experienced and in attitudes toward sunbeds, with correlations between sun-protective behaviors and age and gender (only Table 2), are presented in Table 1 (Survey 2007) and Table 2 (Survey 2008).

The results before the education were as follows: they protect themselves from the sun exposure by using hats, sunglasses, staying in shade or with sunscreens. For both years, the number of students wearing long sleeves and trousers, as a way of protection was insignificant, even after the education. About 60% of students use sunscreens among other protection measures, the majority (85%) of them with sun protection factor (SPF) over 15. The most significant, positive (using more sunscreens) changes were among the youngest students.

About 40% of the students reported they had sunburns (redness, pain, blisters etc.) before; the oldest group of students was the most affected.

There are about 17% of students using sunbeds; most of them (30%) belong to the oldest tested group of students (1989). As for the number of visits, about half of the students answered that it was less than 10 visits annually.

Table 1. Trends in the prevalence of sun protection behavior practices, experienced sunburns and in attitudes toward sunbeds in Serbian youth – Survey 2007

Survey 2007		Year of birth			
Characteristics*		≤1989	1990	1991	≥1992
Wear hat, cap etc.	Spring, %	24.6	34.0	34.7	39.6
	Autumn, %	13.2	28.1	30.1	46.7
	Change, % (95% CI)	11.4 (1.4 to 25.0)	5.9 (1.4 to 10.4)	4.6 (0.9 to 8.4)	-7.1 (-30 to 15.9)
Wear sunglasses	Spring, %	37.8	39.8	38.6	28.3
	Autumn, %	57.1	49.2	42.8	56.7
	Change, % (95% CI)	-19.3 (-37.1 to -1.5) ^b	-9.4 (-14.3 to -4.4) ^w	-4.2 (-8.2 to -0.2) ^b	-28.4 (-50.7 to -6.1) ^b
Wear long sleeves	Spring, %	2.8	2.9	2.0	5.7
	Autumn, %	5.7	4.0	1.9	3.3
	Change, % (95% CI)	-2.9 (-11.1 to 5.4)	-1.1 (-2.9 to 0.8)	0.1 (-1 to 1.3)	2.4 (-6.9 to 11.5)
Use sunscreen	Spring, %	61.9	60.4	58.0	56.7
	Autumn, %	48.6	60.3	60.6	66.7
	Change, % (95% CI)	13.3 (-4.6 to 31.4)	0.1 (-4.8 to 5)	-2.6 (-6.6 to 1.4)	-10.0 (-32.3 to 12.2)
Seek shade	Spring, %	39.2	45.4	42.6	37.7
	Autumn, %	22.9	37.2	43.9	33.3
	Change, % (95% CI)	16.3 (1.1 to 31.7) ^b	8.2 (3.4 to 13.1) ^w	-1.3 (-5.3 to 2.7)	4.4 (-17.7 to 26.5)
Had sunburns	Spring, %	44.7	40.8	40.1	30.2
	Autumn, %	28.6	42.6	35.1	16.7
	Change, % (95% CI)	16.1 (-0.3 to 32.5)	-1.8 (-6.7 to 3.1)	5.0 (1.1 to 8.9) ^b	13.5 (-5.2 to 32.3)
Visit sunbeds	Spring, %	32.6	16.6	14.0	14.0
	Autumn, %	20.0	15.5	12.7	6.7
	Change, % (95% CI)	12.6 (-2.0 to 27.2)	1.1 (-2.5 to 4.8)	1.3 (-1.4 to 4.1)	7.3 (-2.2 to 17.0)

* Please refer to the Appendix for the detailed information on the questionnaire.

^b p<0.05, ^w p<0.001, 95% CI – 95% confidence interval

Table 2. Trends in the prevalence of sun protection behavior practices, experienced sunburns and in attitudes toward sunbeds in Serbian youth – Survey 2008

Survey 2008		Year of birth				Gender	
Characteristics*		≤1989	1990	1991	≥1992	Girls	Boys
Wear hat, cap etc.	Spring, %	30.5	33.8	34.3	25.5	32.1	35.4
	Autumn, %	26.8	30.2	31.4	25.0	25.6	37.9
	Change, % (95% CI)	3.7 (-8.8 to 16.1)	3.6 (-1.75 to 8.8)	2.9 (-1.4 to 7.2)	0.5 (-15.8 to 16.9)	6.5 (2.8 to 10.3) ^w	-2.5 (-7.7 to 2.7)
Wear sunglasses	Spring, %	46.2	42.2	42.1	44.7	47.0	36.1
	Autumn, %	46.4	50.1	42.6	52.8	51.6	36.6
	Change, % (95% CI)	-0.2 (-14.2 to 13.7)	-0.9 (-13.6 to -2.2) ^d	-0.5 (-5.0 to 4.0)	-8.1 (-26.8 to 10.6)	-4.6 (-8.7 to -0.3) ^d	-0.5 (-5.7 to 4.7)
Wear long sleeves	Spring, %	3.1	1.5	1.4	2.1	1.3	2.5
	Autumn, %	3.6	1.0	3.7	2.8	2.7	2.7
	Change, % (95% CI)	-0.5 (-5.7 to 4.7)	0.5 (-0.7 to 1.7)	-2.3 (-3.8 to -0.7) ^d	-0.7 (-6.4 to 5.1)	-1.4 (-2.7 to -0.1) ^d	-0.2 (-1.8 to 1.6)
Use sunscreen	Spring, %	58.5	62.9	62.3	68.1	75.5	36.6
	Autumn, %	67.9	70.8	62.0	79.2	82.2	41.7
	Change, % (95% CI)	-9.4 (-22.5 to 3.7)	-0.9 (-13.2 to -2.6) ^d	0.3 (-4.2 to 4.8)	-11.1 (-27.8 to 5.6)	-6.7 (-10.1 to -3.4) ^w	-5.1 (-10.4 to 0.2) ^d
Seek shade	Spring, %	49.6	43.6	41.3	38.3	34.6	56.7
	Autumn, %	50.2	41.3	43.2	40.3	31.2	59.9
	Change, % (95% CI)	-1.6 (-15.4 to 12.4)	2.3 (-3.4 to 7.9)	-1.9 (-6.4 to 2.7)	-2.0 (-20.3 to 16.3)	3.4 (-0.6 to 7.3)	-3.2 (-8.5 to 2.1)
Had sunburns	Spring, %	50.3	45.3	41.6	46.8	40.8	51.6
	Autumn, %	55.4	40.8	37.5	31.9	35.4	45.0
	Change, % (95% CI)	-5.1 (-19.0 to 8.9)	4.5 (-1.1 to 10.2)	4.1 (-0.3 to 8.6)	14.9 (-3.4 to 33.1)	5.4 (1.3 to 9.4) ^d	6.6 (1.2 to 12.0) ^d
Visit sunbeds	Spring, %	22.9	16.1	13.5	19.1	23.5	2.8
	Autumn, %	7.1	13.9	13.8	15.3	20.6	2.7
	Change, % (95% CI)	15.8 (8.1 to 23.4) ^w	2.2 (-1.8 to 6.2)	-0.3 (-3.5 to 2.8)	3.8 (-10.4 to 18.2)	2.9 (-0.6 to 6.4)	0.1 (-1.6 to 1.9)

* Please refer to the Appendix for the detailed information on the questionnaire.

^d p<0.05, ^w p<0.001, 95% CI – 95% confidence interval

Only 1% of the tested students had solar keratoses and skin cancer in the family so far.

The girls use sunglasses and sunscreens more than the boys. Also, they visit sunbeds much more often than the boys. On the contrary, the boys prefer using shade as a measure of sun protection, and had sunburns more often than the girls.

DISCUSSION

Successful health promotion and skin cancer primary prevention efforts must focus on adolescent education about proper sun protection and sun behavior. There were many published studies dealing with programs for skin cancer prevention [5, 14-18].

Most of them are conducted in Australia and USA, very few in UK and the rest of Europe. All of these studies obtained similar results and had similar experiences: it is very hard and time-consuming to transfer knowledge into the positive behavior.

Neither a broad social campaign focused on sun protection, nor any educational programs were undertaken in Serbia, yet. Some media campaigns periodically occurred, but with contradictory and confusing key messages. Suntan is fashionable; the choice of clothes, hats and sunglasses also depends on the current fashion. This underlines the enormous influence of media, with actors, singers and other celebrities often promoting suntan by their behavior and appearance. On the other side, a low public awareness and insufficient knowledge of parents and teachers cannot compete with the media influence and change attitudes among children and youth.

Therefore, health promotion educational programs supported by the broad public campaigns are necessary. Schools could offer structured and organized educational programs to promote „sun smart“ behavior. Legislation is also important, particularly regulations related to sunbeds use. Support from all who can actively encourage the youth to practice appropriate sun protection practices is also important: local community, sport organizations, pediatricians, teen peer advocates etc. Those comprehensive approaches have shown to be much more effective in changing the sun behavior [5, 18, 19, 20].

In creating educational campaigns for adolescents, it is very important to focus on the esthetic effects of sun exposure and risks to physical appearance (wrinkles, dark spots etc), not only on health aspects. In our educational interventions, students were very interested in cosmetic products for sun protection, sun-tan and similar products and their appropriate use, similar to experiences from [15, 21, 22, 23]. Protecting attractive physical appearance can motivate young people to change attitudes and behavior at least in short-term period.

Our results show that students older than 16 usually use sunbeds, similar results were obtained in a study by Cokkinides et al. [24]. Although during the education the adverse effects of UV radiation from the use of indoor tanning equipment was stressed out, it is difficult to evaluate

the observed significant decrease in sunbeds use, since it could be, at least to some extent, attributed to the timing of evaluation by questionnaires (first one in spring, and second one in autumn i.e. after the summer holidays).

It is normal that students were under different influences - society, media, friends, Internet, fashion etc. during the 6-months follow-up (before and after assessment of the educational intervention). They can change their attitudes again. The changes in the behavior of our student cohort after the educational program were small. A statistically significant behavior change was observed for sunglasses use. As data were based on self-reports of the students, one of the explanations for the modest behavior change is that although the majority of the respondents are aware of health risks of sun exposure, they ignore it because they find the suntan fashionable. The increase, although not statistically significant, was observed in a number of students trying to avoid sun exposure in critical hours and preparing their skin for sun exposure by gradual exposure in spring. These results are valuable for further follow-up, and represent small but important sun-behavior changes.

The particular aim of our study was gender differences, which was done by stratified groups. Girls are much more concerned about sun protection – they use sunglasses and sunscreens, but also sunbeds much more often than boys. On the contrary, boys are hiding in the shade to protect skin, but they get more sunburns than girls. Similar results to ours are reported by different research groups [19, 25]. Like in other reports, our data confirmed that girls were far more likely to use tanning bed, especially older girls [19]. Sunscreen use was inversely associated with age for both genders of all subgroups, which is in accordance with other findings [17].

Results and experiences from this program can be used in future health protection /primary prevention educational programs, either as independent programs or as a part of school curricula. Since the experience of the two-year period from Serbia is good, it seems that this Program is adjusted to the target group, attracts students' attention and increases their awareness.

Limitations of the study

There are several limitations of this program:

- this is a non-controlled intervention and there are many hindrances to the validity of study findings;
- the results are based on self-reports of the students, without validation on actually observed behavior change;
- significant changes in sunglasses use could be partially explained by sunglasses being fashionable and/or considered as status symbol;
- decrease in sunbed use can be attributed to the time of the year (autumn) when sun tan is less important;
- two years are relatively a short time to induce relevant and consistent changes in students' behavior, thus a more comprehensive approach is necessary to gain better results.

CONCLUSION

Educational program “Sun bathing – yes or no?” has provoked changes in attitudes and induced minor changes in behavior among high school students in Serbia. Sunglasses use has increased. Gender differences are not statistically significant, but worthwhile of further research, particularly a gradual preparation of the skin for the sun and critical hour avoidance. Experiences from this program will be used in planning further health promotion activities.

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APPENDIX**Behavior test – Questionnaire**

1. Year of birth? _____
2. Gender? _____
3. You have:
 - Light colored hair
 - Light colored eyes
 - Brown colored hair
 - Brown colored eyes
 - Black colored hair
 - Black colored eyes?
4. Your skin is:
 - Fair, with dark spots, easy burns, never tans
 - Moderately burns, moderately tans
 - Rarely burns, fast and easy tans
 - Many dark spots, after every vacation new spots and nevus appears?
5. What % of your free time you spend outdoors?
 - Up to 10%
 - 10-30%
 - 30-50%
 - Over 50%
6. Do you avoid critical hours (10:00–16:00) when you plan sports activities, walks or sunbathing?
 - Yes
 - No
7. Do you prepare your skin for sun, expose it gradually and try to protect from sunburns?
 - Yes
 - No
8. Do you protect yourself from sun by:
 - wearing hats,
 - wearing sunglasses,
 - wearing long sleeves and trousers,
 - staying mostly in shade,
 - using sunscreens?
9. If you use sunscreens, it is with SPF:
 - <15,
 - 15–30,
 - >30?
10. Have you ever had sunburns (redness, pain, blisters...)?
 - Yes
 - No
11. Do you use sunbeds?
 - Yes
 - No
12. If yes, how many times per year?
 - <10
 - 10–20
 - >20
13. Did you have any type of solar keratoses or skin cancer in the family?
 - Yes
 - No

Утицај образовања на понашање адолесцената на сунцу: искуства из Србије

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КРАТАК САДРЖАЈ

Увод У Србији није било шире организоване образовне кампање, нити програма образовања средњошколаца о заштити од сунца.

Циљ рада Основни циљ рада био је да се утврди утицај образовног програма на промене ставова и понашања у погледу заштите од сунца код ученика у средњим школама. Посебан циљ је био да се испита има ли родне и старосне разлике у понашању.

Методе рада Образовни програм је дизајниран тако да изазове промене ставова и понашања. Програм је спроведен у Београду у два циклуса – током 2007. и 2008. године. Узорак су чинили ученици узраста од 16 и 17 година. Пре и после овог програма ученици су попуњавали упитник који је осмишљен за потребе студије (о типу коже и понашању на сунцу). Одговори ученика о ставовима у вези са излагањем сунцу и понашању на сунцу пре и после програма упоређивани су и анализирани Пирсоновим (*Pearson*) χ^2 -тестом и

логистичком регресионом анализом. У другом образовном циклусу (2008) анализирана је родна и старосна разлика у понашању.

Резултати У истраживању је учествовало 3.205 средњошколаца у 2007. години и 2.155 у 2008. из укупно 11 школа. Статистички значајна промена понашања уочена је код употребе наочара за сунце у 2007. години, будући да се број ученика који користе наочаре за сунце повећао са 41,6% на 45,6% ($p < 0,05$). Није било значајних промена у примени других средстава заштите (препарата за заштиту од сунца, заштитне одеће или боравак у хладу).

Закључак Образовни програм јесте утицао на промене ставова и понашања ученика у вези са боравком на сунцу, али да би се постигле значајније промене у погледу ставова о заштити и понашању на сунцу, потребне су шире активности које би укључиле школе, локалну заједницу и медије.

Кључне речи: адолесценти; едукација; понашање на сунцу; ставови; промоција здравља; примарна превенција

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