

APPENDIX—List of Variables Investigated by the Structured Personal Interview

1. *Personal information.* Subject's name, address, age, and educational level; occupations of subject and spouse; socioeconomic status (by employment skills rating); family structure; smoking; medication; substance use and abuse.
2. *Antenatal care.* Parity, previous stillbirths and/or birth defects, contraceptive use, spacing, general health, illnesses, accidents, results of diagnostic tests, medication, supplements, clinic attendance.
3. *Index baby.* Name; sex; date of birth; gestation; birth weight; month, year, and place of conception; place and type of delivery; health status at birth; admission(s) to hospital, diagnosis, treatment, and outcome.
4. *Hurricane experiences.* Subject's personal experiences in the aftermath of Hurricane Gilbert. Physical and psychosocial stress, damage, relocation, available food, drinking water.
5. *Periconceptional period.* Nutritional status (as described by the subject), supplements, medications, oral contraceptive use, illnesses, accidents, smoking, substance use and abuse, use of "bush teas," exposure to pesticides, consumption of previously suspected teratogenic foods (i.e., potato, Jamaican white yam, ackee, and/or cassava), pica, unusual stressful events. Exploration of periconceptional diet, determination of the "folate score."

The Use of Commercial Tanning Facilities by Suburban Minnesota Adolescents

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ABSTRACT

In 1991, 1008 suburban St. Paul, Minn, high school students were surveyed via self-administered questionnaire regarding use of commercial tanning facilities, injuries experienced from tanning, use of protective measures while tanning indoors, and knowledge of the risks of tanning. Overall, 34% of the respondents had used commercial tanning facilities. Fifty percent said they had not been warned by tanning facility operators about the risks of tanning indoors, 28% reported not being told to wear goggles, and 17% reported never wearing goggles. The results indicate that these adolescents use commercial tanning services at high rates, and often in ways that increase their risk for a variety of health problems. (*Am J Public Health.* 1994;84:476-478)

Introduction

Exposure to ultraviolet radiation, such as that from artificial tanning devices, is a risk factor for a variety of health problems including erythema, vesiculation, photosensitizing reactions, actinic elastosis, keratoses, basal cell and/or squamous cell carcinoma, and malignant melanoma.¹⁻³ Exposure to ultraviolet radiation can also result in compromised immune response, eye burns, and cataracts.

The risk of many health problems is higher when ultraviolet radiation exposure occurs prior to adulthood.⁴ The damage begins with a child's first exposure and accumulates through his or her lifetime.^{5,6} It is estimated that up to 78% of the risk from ultraviolet radiation exposure is completed by age 18.⁷

Indoor tanning is not safer than tanning in natural sunlight. Commercial tanning devices emit either mostly ultraviolet A or mostly ultraviolet B.^{2,8,9} Although ultraviolet B injures the skin faster, ultraviolet A penetrates the skin more deeply.^{9,10} Some commercial tanning beds may emit as much as 10 times more ultraviolet A than natural sunlight.²

Artificial tanning produces no known health benefits,³ nor is it thought

possible to tan safely.⁶ Exposure to ultraviolet radiation from indoor tanning increases the chances of developing cancer from natural sunlight.^{11,12} The sun protection factor from tanning indoors is only about 4, which offers no significant protection from sun exposure.¹³ Moreover, severe ultraviolet radiation burns (those that cause pain for 48 hours or more¹⁴) increase the risk for malignant melanoma.^{4,15}

Despite the serious risks associated with artificial tanning, fewer than half of the states currently regulate commercial tanning facilities. The US Food and Drug Administration (FDA) regulation requires only that the device be equipped with a calibrated timer, protective eyewear, and a small warning label.¹⁶ A previous study found that 45% of all commercial tanning devices examined

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TABLE 1—Lifetime Prevalence of Use of Commercial Tanning Facilities

	n ^a	Lifetime Prevalence, %
Gender		
Male	469	15
Female	511	51
Age		
14 y	135	18
15 y	303	29
16 y	261	34
≥ 17 y	283	46
Total	987	34

^aThese n's reflect missing values for gender (28), age (26), or tanning experience (21).

did not have the mandated FDA warning label and 50% of the commercial facilities surveyed had at least one improperly labeled machine.¹⁷

Despite the risks of artificial tanning, little information is available concerning use of tanning devices among the general population and specifically among adolescents. The purpose of this study was to characterize for the first time the prevalence and patterns of use of indoor tanning facilities by adolescents, the health problems associated with adolescents' use of commercial tanning equipment, and adolescents' knowledge of the risks associated with indoor tanning.

Methods

The study sample consisted of all students in grades 9 through 12 from a suburban high school in the St. Paul, Minn, metropolitan area. The survey was self-administered during homeroom and took approximately 5 minutes to complete. A copy of the instrument is available from the author on request. The response rate was 84% (13% absent or missing, 2% refusing, and 1% insincere reporting), yielding a final n of 1008. The sample resembled the Twin Cities suburban population; 88% of the respondents were White. Females slightly outnumbered males (51% to 48%). Participants' ages ranged from 13 to 19 years.

In the survey, students were asked questions to determine their skin type, their history of sun exposure, and their

TABLE 2—Reported Age of First Use of Commercial Tanning Facility, by Age of User

Age of User	n ^a	Age of First Use, %			
		9–11 y	12–14 y	15–17 y	> 17 y
14 y	22	...	100
15 y	80	8	81	11	...
16 y	88	...	53	47	...
≥ 17 y	111	2	22	74	2

^aThese n's reflect the fact that 30 of the 331 tanners had missing values for either age of first use or age of respondent.

current and past use of commercial tanning equipment. In addition, they were asked to report problems experienced as a result of tanning indoors, their use of protective eyewear, and information received from tanning facility operators regarding the risks of indoor tanning. Questions to ascertain the students' knowledge about the risks of tanning indoors were also asked.

Chi-square tests for independence were used to determine whether high-risk tanning behaviors were associated with each other.

Results

Overall, 34% of the students reported using a tanning facility (Table 1). The lifetime prevalence of indoor tanning was 51% for females and 15% for males. Almost 20% of those aged 14 years or younger reported using a tanning facility; those aged 15, 16, and 17 years or older reported 29%, 34%, and 46% use, respectively. Students' age of first indoor tanning ranged from 9 to 18 years, with more than half beginning before age 15 (Table 2). Those who reported at least one exposure to indoor tanning (n = 331) will be referred to as "tanners."

Most tanners (72%) reported indoor tanning infrequently (less than once a month or on special occasions). However, 28% of all tanners tanned at least once per month and 15% reported tanning once a week or more (Table 3).

The reported usual length of a tanning session ranged from 5 minutes to more than 60 minutes. The majority of tanners reported sessions lasting from 21 to 30 minutes (Table 3). Most reported their longest session as 30 minutes. However, 11% of the tanners reported tanning indoors for more than 30 minutes. More than 40% of the tanners

TABLE 3—Practices of Users of Commercial Tanning Facilities

	%
Average length of tanning session (n = 322)	
1–10 min	4
11–20 min	30
21–30 min	63
> 30 min	3
Longest single session (n = 325)	
< 30 min	43
30 min	46
> 30 min	11
Use of goggles while tanning (n = 327)	
Always	59
Usually	11
Sometimes	13
Never	17
Frequency of sessions (n = 326)	
≥ 1/week	15
< 1/week but ≥ 1/month	13
< 1/month	72

reported not always wearing goggles and 17% reported never wearing them. Chi-square tests of association revealed that those who reported longer usual tanning sessions were less likely to use goggles ($P = .06$) and more likely to tan frequently ($P = .02$).

Skin and eye problems were frequently reported by indoor tanners. Approximately 16% of the tanners had experienced one or more eye problems, including pinkeye, eye burns, or sandy or gritty eyes. Fifty-nine percent reported some skin injury, including burned, blistered, or peeled skin and/or rashes.

Tanners were asked to report the instructions and warnings they received

TABLE 4—Reported Instructions and Warnings from Tanning Facility Attendant

	%
Told to wear goggles (n = 314)	
Always	42
Usually	16
Sometimes	14
Never	28
Told to limit length of session (n = 314)	
Always	35
Usually	13
Sometimes	25
Never	26
Received warning about the health risks of indoor tanning (n = 305)	
Yes, written	30
Yes, verbal	9
Yes, both	11
Never	50
Ever noticed a sign warning of the risks of indoor tanning (n = 301)	
	48

from operators at the business where they tanned most often. Table 4 shows that more than half were not always told to wear goggles, more than a fourth said they were never told to limit their time per session, half reported that they had never received a warning about the health risks of indoor tanning, and fewer than half had ever noticed a sign warning of the health risks of tanning.

All students were asked to respond to true/false statements regarding the risks of indoor tanning. Sixty-one percent knew that closing their eyes or covering them with cotton balls while tanning was not enough protection, 71% knew that indoor tanning is not safer than natural sunlight, 79% knew that indoor tanning could cause skin cancer, and 77% were aware that damage could occur from tanning even without a sunburn. Only 22% of the students knew that tanning is more harmful to adolescents than adults. The tanners were as knowledgeable as those who had never tanned indoors.

Discussion

Our results indicate that these adolescents, especially females, use com-

mercial tanning devices at high rates, begin tanning indoors at young ages, and often do not engage in protective behaviors. Especially alarming is the number of weekly tanners (15% of tanners) and the number who infrequently or never use goggles while tanning indoors (30% of tanners). Furthermore, it appears that tanning facility operators often do not warn users of the risks of tanning, and the FDA warning is not noticeable to the majority of adolescent tanners.

In Minnesota communities, commercial tanning facilities are readily available. For instance, 33 tanning businesses with a total of 150 tanning beds were located in the suburban area where students included in this survey live, or 1 tanning bed for every 1200 residents.

Despite the health risks associated with indoor tanning during adolescence, many commercial tanning facilities in Minnesota target this population. Indoor tanning facilities often offer a variety of student discounts and promotions, such as price reductions, multiple tanning session packages, advertisements in school yearbooks and student newspapers, and free tanning coupons as prizes at school functions.

Of the 22 states that regulate commercial tanning facilities, only about half require parental consent for use of commercial tanning facilities, and none prohibit their use by minors. This is despite the recommendations made by the American Academy of Dermatology,³ the American Medical Association,⁵ the Skin Cancer Foundation,¹⁸ the American Cancer Society,¹⁹ and the United States Public Interest Research Group¹⁷ for prohibition or severe limitations of use by minors and adults.

The limitations of this study include the use of self-reports about tanning activity, the fact that reports of medical problems were not validated, and the use of a single suburban school as the only data collection site, which limits generalizability. However, these data indicate the potential for widespread exposure to serious health risks in this population. Further studies are needed to explore the prevalence of adolescent use nationwide and to document acute and chronic injury caused by the use of commercial tanning devices. □

Acknowledgments

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