

Prevalence of exposure to artificial UV radiation for tanning purposes

The indoor tanning industry developed in Europe and the USA in the early 1980s, a time when UVA radiation was thought to be harmless, with the introduction of tanning appliances emitting UVA at levels similar to or even exceeding those from natural sunlight. In the USA, indoor tanning is now a more than \$5 billion industry that employs 160,000 persons (Indoor Tanning Association, 2004), and in the United Kingdom the turnover in the indoor tanning industry exceeds an estimated £100 million per annum (source: www.ray-watch.co.uk; accessed on 15/06/2005).

Prevalence of exposure by region/country

Indoor tanning is a widespread practice in most developed countries, particularly in Northern Europe and the USA, and is gaining popularity even in sunny countries like Australia.

Few surveys have estimated specifically the prevalence of indoor tanning among adult populations. In 1996, a telephone survey was carried out among white adults (18 to 60 years old) from the two most densely populated regions (Montreal and Quebec) of the Province of Quebec, Canada (Rhainds *et al.*, 1999). Of the 1003 respondents, 20% reported having used a tanning appliance in a commercial tanning facility at least once during the last 5 years before the survey. The prevalence of use during the last 12 months before the study was 11%.

Recently, a brief report describing prevalence of indoor tanning in Minnesota, USA, derived from a telephone interview (45% response rate) concerning quality of life, employment and health of 802 randomly selected adults, showed that in 2002, 38% of adults had ever used indoor tanning facilities (Lazovich *et al.*, 2005).

The prevalence of use of indoor tanning facilities can be estimated from the proportion of exposed controls in population-based case-control studies on risk factors for melanoma and basal and squamous cell skin cancers (Table 3).

The prevalence varies greatly with country, gender and age. Prevalence of ever having used indoor tanning facilities ranges from 5% in Northern Italy to 87% in Swedish women, and is currently very high in Northern European countries, particularly in Sweden and the Netherlands. Prevalence of exposure to tanning appliances may still be low in some European countries or populations. In a survey conducted among 33,021 adults older than 30 years attending health check-up centres in France, only 2% of subjects reported use of indoor tanning facilities (Stoebner-Delbarre *et al.*, 2001).

Time trends

The prevalence of indoor tanning is currently increasing in many countries, and current available estimates may therefore be rapidly outdated. In studies conducted approximately 20 years ago, the practice of indoor tanning was generally low: 7% in Germany, 18% in Denmark. Prevalence of exposure to tanning appliances by the controls included in case-control studies is higher in the most recent studies than in studies conducted before 1990 (Table 3).

A survey in Minnesota (Lazovich *et al.*, 2005) indicated that prevalence of use has increased over the last decades. Few men and women had used a tanning appliance before 1980. Women were almost twice as likely as men to report tanning indoors during the 1980s (19% versus 10%), but in the following decade, the proportion of men using indoor tanning facilities approached that of women (15% versus 17% in the 1990s).

The fact that the prevalence of indoor tanning has increased during the 1990s can be demonstrated by comparing prevalence of use as reported in studies conducted by the same investigators in the same countries at intervals of several years.

A case-control study conducted in 1991 in five centres in Belgium, France and Germany

Table 3. Prevalence of use of indoor tanning facilities by population controls from epidemiological studies

Reference	Location	Inclusive years of recruitment	Disease ¹	Type of Study	No. of controls	Source of controls	Age range (years)	Prevalence of ever use	
								Number	%
Holman <i>et al.</i> (1986)	Western Australia	1980-1981	M	Case-control	511	Population, electoral roll, matched on age, sex	NR	NR	NR
Osterlind <i>et al.</i> (1988)	East Denmark	Oct. 1982-Mar. 1985	M	Case-control	926	Population, National Population Register	20-79	168	18
Zanetti <i>et al.</i> (1988)	Torino, Italy	May 1984-Oct. 1986	M	Case-control	416	Population, from the National Health Service	NR	21	5
Walter <i>et al.</i> (1990 and 1999)	Southern Ontario, Canada	Oct. 1984-Sep. 1986	M	Case-control	608	Population, Property tax assessment rolls	20-69	109	18
Aulier <i>et al.</i> (1994)	Germany, France, Belgium	Jan. 1991 onwards	M	Case-control	447	Population, door to door	≥ 20	120	27
Westerdahl <i>et al.</i> (1994)	Sweden	July 1988-June 1990	M	Case-control	640	Population, National Population Registry	15-75	159	25
Holly <i>et al.</i> (1995)	San Francisco, USA	Jan. 1981-Dec. 1986	M	Case-control	452	Population, random digit telephone dialling	25-59	NR	NR
Bajdik <i>et al.</i> (1996)	Alberta, Canada	1983	BCC / SCC	Case-control	406	Population, health insurance plan subscriber list	25-79	33	8.1
Chen <i>et al.</i> (1998)	Connecticut, USA	Jan. 1987-May 1989	M	Case-control	512	Population, telephone random digit dialling	NR	95	19
Westerdahl <i>et al.</i> (2000)	South Health Care region, Sweden	Jan. 1995-June 1997	M	Case-control	913	Population, National Population Registry	NR	372	41
Karagas <i>et al.</i> (2002)	New Hampshire, USA	July 1993-June 1995	BCC / SCC	Case-control	539	Population, Dept. of Transportation, medicare Medicaid	25-74	75	14
Veierød <i>et al.</i> (2003)	Norway and Sweden	1991	M	Cohort	79616	Population, prospective cohort	10-39	14 377 ²	18
Bataille <i>et al.</i> (2004)	North East Thames, UK	Aug. 1989-July 1993	M	Case-control	416	Hospital and general practice, excluding skin disease	16-75	110	26
Bataille <i>et al.</i> (2005)	Belgium, France, Netherlands, Sweden & UK	Dec. 1998-July 2001	M	Case-control	622	Sweden, population-based; France & Belgium, door to door; UK & Netherlands, GP	18-50	354	57

NR, not reported; GP, general practitioner
¹ BCC, basal cell carcinoma; M, melanoma; SCC, squamous cell carcinoma
² ≥ 1 time/month

(Autier *et al.*, 1994) showed that 19% of controls had ever exposed themselves to a sunlamp or a sunbed, this proportion being higher in Germany (25%) than in Belgium (20%) or in France (6%). Of the recorded exposures, 84% had started after 1979. In a more recent case-control study conducted by the same investigators between 1998 and 2000 in Belgium, France, Sweden, the Netherlands and the United Kingdom among persons younger than 50 years (mean age of controls, 37 years), 57% of controls had ever exposed themselves to artificial UV tanning, with the highest prevalence of use being found in Sweden (87%) (Bataille *et al.*, 2005).

According to two studies conducted within the same population in the south of Sweden in 1988–1990 and in 1995–1997, the prevalence of exposure doubled in 7 years. In 1988–1990, 46% of individuals younger than 30 years had ever exposed themselves to sun lamps or solariums (56% of women and 12% of men, these figures being higher in the group aged 15–24 years) while this proportion was only 24% among individuals older than 30 years (31% of women and 16% of men) (Westerdahl *et al.*, 1994). After 1995, the prevalence of solarium use in the population aged 16–80 years was 41%, but 70% of women and 50% of men aged 18–50 years reported having ever used a solarium (Westerdahl *et al.*, 2000).

Personal characteristics of adult users

Sex

Use of indoor tanning facilities is more prevalent among women, particularly among younger age groups and in Northern countries.

A survey of tanning appliances in commercial use in Scotland was conducted in 1997 to measure the spectral irradiance of the different models and compare this irradiance with UV doses received during sunbathing (McGinley *et al.*, 1998). As part of the study, a questionnaire was distributed to sunbed users, seeking information about their age, sex, skin type, frequency of use, attitudes and reasons for use. A total of 205 questionnaires were collected. The majority of users were women (170 versus 35 men).

A significantly higher proportion of women and young people (18–34 years old) was found among tanning bed users in the Montreal–Quebec survey (Rhainds *et al.*, 1999). In the Minnesota survey (Lazovich *et al.*, 2005), indoor tanning was also more prevalent among women than among men: 45% versus 30%. Among users, the median number of times used was 10 for men and 20 for women (range, 1–600), and 21% of women reported frequent use (defined as more than 30 times).

In Europe, a recent case-control study found use of indoor tanning facilities to be more prevalent among women (61%) than among men (43%) (Bataille *et al.*, 2005). Another recent survey explored exposure to tanning appliances and sun exposure behaviour in a cohort of adult volunteers. In 2001, a self-administered questionnaire was specifically developed and addressed to 12 741 adult volunteers in France enrolled in the SU.VI.MAX cohort (a cohort recruited in 1994 and followed for 8 years, which included men aged 45–60 years and women aged 35–60 years). Over 60% of the questionnaires were returned, of which 97% were useable. Among the 7 359 individuals who answered the questionnaire, 1 179 (16%) – 953 women (22%) and 226 men (8%) – reported having ever experienced indoor tanning. Men and women reported similar prevalences for regular use (6% and 7%, respectively) and for a duration of at least five years (10% for men and women). Among women, 44% of users belonged to the youngest age group at recruitment (35–44 years), versus 33% in non-users (in men, data were not available for this age group); 48% of female users lived in the North or in Ile-de-France, versus 39% of non-users (45% and 36% for men, respectively) (Ezzedine *et al.*, 2005) (Table 4).

Bataille *et al.* (2005) recently observed that indoor tanning is becoming more frequent in men and in younger age groups, with important variations by country: exposure of men is highest in Sweden (78%) and Netherlands (60%), while 39% of men in the United Kingdom and 13% in France reported ever having used indoor tanning facilities.

Table 4. Lifetime use of indoor tanning facilities and sun exposure behaviour among 7 359 healthy adults (SU.VI.MAX cohort)

Use of indoor tanning facilities	Women		Men	
	Users N = 953 (22%)	Non-users	Users N = 226 (8%)	Non-users
Regular use	7%	-	6%	-
Use ≥ 5 years	10%	-	10%	-
Residence North of France or Ile-de-France	48%	39%	45%	36%
Sunbathing between 11 a.m. and 4 p.m.	56%	37%	53%	38%
Regular sunscreen use during sunbathing	39%	24%	17%	7%
Progressive sun exposure	54%	43%	53%	38%
Nudism	13%	6%	19%	8%
Sunburns in adulthood	93%	88%	93%	89%
Important or extreme tan seeking behaviour	37%	20%	26%	11%

From Ezzedine *et al.* (2005)

Age

Younger age (<35 years) is significantly associated with higher likelihood of using indoor tanning facilities among both men and women.

In an early case–control study conducted in several countries in Europe (Autier *et al.*, 1994), indoor tanning was more prevalent in younger age groups (31% among controls < 40 years). In a more recent case–control study in Europe (Bataille *et al.*, 2005), exposure before the age of 15 years was reported in 3% of all controls, but reached 20% in Sweden. The mean age at first exposure was 20 years in Sweden, 23 years in the United Kingdom and 27 years in France.

In the survey conducted in Scotland (McGinley *et al.*, 1998), 73% of users were under 35 years old, with 32% of users being under 25 years old.

In the Minnesota survey (Lazovich *et al.*, 2005), 13% of men and 22% of women reported first tanning indoors as adolescents.

Skin type

Few studies have analysed specifically the use of indoor tanning facilities as a function of skin type. Since most studies have been conducted primarily in relation to skin cancer risk factors, use by skin type cannot be derived from the reported results.

In the survey conducted in Scotland (McGinley *et al.*, 1998), 38% of users described

their skin phototype as type I or II, and 38% also indicated that they had experienced an adverse reaction when using indoor tanning facilities; 31% of users had more than 10 courses of over 5 sessions in a year, and for 16% this amounted to over 100 sessions per year.

In several case–control studies, use of indoor tanning facilities was more frequent among controls with a poor ability to tan: for example, 27% and 31% among controls with blond or red hair, respectively, in a European study (Autier *et al.*, 1994).

In the SU.VI.MAX cohort, individuals with a pale complexion were more likely to use indoor tanning facilities (Ezzedine *et al.*, 2005). This was not the case among controls from a recent case–control study conducted in Europe, where approximately one third of controls using indoor tanning facilities were of phototype I or II (Bataille *et al.*, 2005) (Table 5). However, it must be stressed that in this study, phototype was declared by participants and it is likely that few of them perceived themselves as sun-sensitive, as exemplified by the very low proportion of persons with self-reported phototype I in the Swedish population.

Other factors

Higher education levels or income are significantly associated with a higher likelihood of using indoor tanning facilities among men.

Table 5. Prevalence of indoor tanning according to skin type among controls in a European case-control study (Bataille *et al.*, 2005)

Country	Phototype (%)			
	I	II	III	IV
Belgium	13.3	23.3	43.3	20.0
France	6.4	38.7	25.8	29.0
Sweden	1.2	24.7	64.2	9.8
The Netherlands	6.0	17.9	53.0	23.1
United Kingdom	12.7	32.1	39.0	6.9

Data courtesy of V. Bataille.

The most common reasons given for use of indoor tanning facilities is to develop a "base tan" before a holiday and to feel more relaxed (McGinley *et al.*, 1998).

In the SU.VI.MAX survey, the most frequently reported motivations for using artificial tanning were aesthetic (35%) and skin preparation before sun exposure (34%) (Ezzedine *et al.*, 2005). In this cohort, there was a clear link between use of indoor tanning facilities and sun-seeking behaviour (Table 4).

Personal characteristics of adolescent and children users

Since 1989, a total of 16 studies (18 reports) have examined indoor tanning among children and adolescents aged 8–19 years. These studies are summarised in Table 6 (see Lazovich & Forster, 2005 for review). Studies were conducted in Europe (Norway, Sweden and the United Kingdom), in various locations throughout the USA (including two nationally representative samples) and in Australia. Adolescents were identified through paediatric clinics, schools, as offspring of adult cohort study participants, or through random selection of defined populations. Sample size ranged from 96 to over 15,000. Use of indoor tanning facilities was defined either as ever use, or use in the past 6 or 12 months. Given the differences in the study populations and in the definition of indoor tanning between studies, it is not surprising that prevalence estimates vary

greatly. However, all these studies show frequent use by adolescents and children, sometimes at a very young age. According to the most recent studies, 30% of adolescents in Sweden and 24% of adolescents in the USA aged 13–19 years reported ever use of indoor tanning facilities, and 8% and 12% respectively were frequent users (10 times per year or more). In a recent survey in the United Kingdom, while 7% of children aged 8–11 years reported exposure to a sunbed in the last 6 months, as many as 48% expressed a desire to use a sunbed (Hamlet & Kennedy, 2004).

The earliest studies in Sweden and in the USA tended to find indoor tanning to be more prevalent among adolescents with fair skin types who are more prone to sunburn (Mermelstein & Riesenber, 1992; Boldeman *et al.*, 1996; Robinson *et al.*, 1997). More recent studies in the USA found either the opposite (Cokkinides *et al.*, 2002; Geller *et al.*, 2002; Demko *et al.*, 2003) or no association (Lazovich *et al.*, 2004).

Studies of compliance to regulations and recommendations

Few studies have assessed the compliance of indoor tanning facility operators or consumers with recommendations and regulations. In this section, studies are first summarised and then data are presented according to each regulation.

Compliance of operators

(a) *Study descriptions – overall compliance rates:* In 1991, Oliphant *et al.* (1994) surveyed over 1000 high school students aged 13 to 19 years in suburban Minnesota (USA) via a self-administered questionnaire regarding use of indoor tanning facilities and knowledge about risks of indoor tanning. The survey assessed compliance of staff with regulations and recommendations as reported by the users.

In 1998, Culley *et al.* (2001) quantified the level of compliance by indoor tanning facility operators with selected federal and state regulations and recommendations. A person posing as a potential customer visited 54 tanning facilities in

Table 6. Studies of adolescent use of indoor tanning facilities

Reference	Year of survey	Location	Population source	N	Age range (years)	Prevalence (%) ¹			Characteristics assessed in relation to use of indoor tanning facilities
						Boys	Girls	All	
Banks <i>et al.</i> (1992)	1989	Vienna, VA, USA	Adolescents seen at nine pediatrics clinics	96	16–19	16	33	23	Gender, age, frequency
Mermelstein & Riesenberg (1992)	1990	Chicago, IL, USA	10 schools participating in skin cancer intervention study	1 703	9 th and 10 th graders	7	19	NR	Gender, age, skin type
Oliphant <i>et al.</i> (1994)	1991	St. Paul, MN, USA	One high school	1 008	13–19	15	51	34	Gender, age, frequency, knowledge of risks, practice, symptoms
Wichstrom (1994)	1992	Norway	56 randomly selected high schools	15 169	17.3 (mean)	35	75 ²	NR	Gender, age, frequency
Boldeman <i>et al.</i> (1996, 1997)	1993	Stockholm, Sweden	60 randomly selected classes	1 252	14–19	32	68	57	Gender, age, knowledge of risks, smoking, frequency, skin type, symptoms, sunbathing, skin disease, perceived attractiveness, attitudes
Robinson <i>et al.</i> (1997)	1994	Chicago, IL, USA	Population-based random sample	658	11–19	1	16	8	Gender, age, skin type, socio-economic status
Brandberg <i>et al.</i> (1998)	1996	Sweden	Population-based random sample	2 615	13, 15, 17	4	16	10	Gender, age, satisfaction with self
Boldeman <i>et al.</i> (2001)	1999	Stockholm, Sweden	Population-based random sample	4 060	13–19	19	40	30	Gender, age, frequency, symptoms
Lucci <i>et al.</i> (2001)	1999	Dallas & Houston, Texas, USA	Junior and senior high students	210	14–19	NR	NR	18 ³	None
Cokkinides <i>et al.</i> (2002)	1998	USA	Population-based random sample	1 192	11–18	5	16	10 ²	Gender, age, race, parent education and income, residence, sun sensitivity, skin type, sunbathing, sun protection, health-provider advice, attitudes, parent tans

Table 6 (contd)

Reference	Year of survey	Location	Population source	N	Age range (years)	Prevalence (%) ¹			Characteristics assessed in relation to use of indoor tanning facilities
						Boys	Girls	All	
Geller <i>et al.</i> (2002)	1999	USA	Prospective cohort of off-springs of Nurses Health Study	10 079	12–18	2	14	10 ²	Gender, age, skin type, social factors, sun protection, attitudes
Knight <i>et al.</i> (2002)	1999	Bloomington, Indiana, USA	College students attending student health centre	489 402	≥ 17 17–22	38 NR	70 NR	62 52 ²	Gender, age, frequency, skin type, geographical region, reason for using tanning bed, believes about tanning, knowledge of risks
Demko <i>et al.</i> (2003)	1996	USA	132 schools in 80 communities	6 903	13–19	11	37	24	Gender, age, frequency, sun sensitivity, geographical region, school location, student income, maternal education, sunbathing, substance use, diet, obesity, body image, physical activity, body piercing, psychosocial factors
Hamlet & Kennedy (2004)	NR	Wishow Local Health Care, UK	23 primary schools	1 405	8–11	NR	NR	7	Age, frequency, attitudes, exposure at home or on commercial premises.
Lazovich <i>et al.</i> (2004); Stryker <i>et al.</i> (2004)	2000	Minneapolis/St. Paul, MN and Boston, MA, USA	Random sample of households likely to have adolescents	1 273	14–17	12	42	30	Gender, age, smoking, satisfaction with looks, depression, sun protection, skin cancer risks, parent and teen knowledge of risks, parent and teen attitudes, social factors, parent tans, parent education, parent concern, parental influence score
Paul <i>et al.</i> (2004)	2000	New South Wales, Australia	Population-based random sample	1 509 78	≥ 15 15–17 18–29 30–39	5	14	10 4 11 19	Gender, age, attitudes, use of sunscreen

Adapted from Lazovich & Forster (2004)

NR, not reported.

¹Prevalence of ever use, unless otherwise noted.²Past 12 months³Past 6 months

the San Diego, USA metropolitan area. Compliance with 13 regulations/recommendations was assessed by either direct query or observation of the presence/absence of signs and warning labels. No facility was in compliance with all 13 selected regulations. The mean number of regulations complied with was 8.33.

In another study conducted in the San Diego area, in 2000, Kwon *et al.* (2002) assessed the compliance of 60 tanning facilities with recommended exposure schedules by means of a telephone enquiry made by a supposedly prospective customer.

One study, conducted in Australia in 2005, explored compliance with international recommendations on solarium use in an unregulated setting: simulated customers visited 176 solaria in two face-to-face visits for each establishment and one telephone contact. Few (16%) establishments were compliant with more than 10 of the 13 recommendations. Compliance was particularly poor for those recommendations with the greatest potential for minimising harm: i.e. to discourage or exclude persons at high risk from UV exposure (Paul *et al.*, 2005).

(b) Duration/frequency of exposure: In the survey assessing compliance of staff as reported by the users (Oliphant *et al.*, 1994), 26% said they were never told to limit their time per session.

In a later study from the USA (Culley *et al.*, 2001), compliance was found to be relatively high for maximum duration allowed to tan (98%) but was relatively low for presence of and compliance with an appropriate shut-off switch (57%). Frequency allowed to tan had the lowest compliance at 6%; one facility even allowed two consecutive tanning sessions.

In the most recent study from the USA (Kwon *et al.*, 2002), only 4 out of 58 tanning salons (7%) recommended less than 3 sessions in the first week, and therefore were compliant with the regulations. All responded with a duration of exposure of less than 30 minutes, but all reported offering unlimited tanning packages, and less than 30% limited the exposure to once a day.

(c) Wearing of goggles: In the high school student survey cited above (Oliphant *et al.*, 1994), less

than half of the customers interviewed (42%) had always been told to wear goggles, and 28% had never been.

In a more recent study from the USA (Culley *et al.*, 2001), compliance was found to be high for provision and sanitation of protective eyewear (100%) and for requirement to use it (89%).

(d) Age restriction: Very few studies have looked at compliance with age restriction. One study observed a low compliance (43%) with the requirement for parental permission for adolescent users aged 14–18 years (Culley *et al.*, 2001). Low levels of compliance with recommendations relating to age restriction were also found in a more recent study (Paul *et al.*, 2005).

(e) Warning of health risks: In the survey assessing compliance of staff as reported by users (Oliphant *et al.*, 1994), 50% reported that they had never received a warning about the health risks of indoor tanning, and less than half (48%) had ever noticed a warning sign at the facility. In another study in the USA (Culley *et al.*, 2001), compliance was found to be relatively high for presence of labels on warning of UV danger and of exposure (85%) and legibility, accessibility and correctness of these labels (74%); lower compliance (15–20%) was observed for warning signs in the tanning area.

(f) Other regulations: In the Australian study (Paul *et al.*, 2005), 1% of operators refused access to a pretending customer with skin phototype I, and 10% recommended against solarium use. In the same study, low levels of compliance were also found for using a sunbed while taking medications, for provision of consent forms and for discussing safety procedures.

Compliance of customers

(a) Study descriptions: The 1991 high school student survey in the USA (Oliphant *et al.* 1994) has been described above.

McGinley *et al.* (1998) conducted a survey of the output of tanning appliances in use in 1997 in Scotland. At the same time, questionnaires were distributed by the indoor tanning facilities to

users, seeking information on patterns of exposure and reasons for using sunbeds.

In 1996, a telephone survey was carried out among adults from the two most densely populated regions of Quebec, Canada, as described above (Rhainds *et al.*, 1999). The final sample included 1003 white persons 18-60 years old. Interviewers used a standardised questionnaire to document exposure habits to artificial UV radiation sources.

One study was conducted in North Carolina (USA) to assess adherence of indoor tanning clients to FDA-recommended exposure limits. A community-based survey was administered during routine state inspections of 50 indoor tanning facilities. At each facility, users' records were randomly selected ($n = 483$) for a survey of exposure (Hornung *et al.*, 2003).

To gain anecdotal evidence that primary school children were using sunbeds in Lanarkshire (United Kingdom), school nurses conducted a short questionnaire in 23 primary schools in 2003. Children 8-11 years old took part in the classroom surveys. Positive responses were counted by a show of hands by the children (Hamlet & Kennedy, 2004). [This small study was based on a "hands up" survey, which may have biased answers through copying of friends' actions.]

(b) Duration/frequency of use: In the high school student survey, 11% of users reported tanning indoors for more than 30 minutes. Those who reported longer usual tanning sessions were more likely to tan frequently (Oliphant *et al.*, 1994).

A user survey demonstrated that 31% of 205 responders had more than 10 courses of over five tanning sessions in a year and, for 16% of them, this amounted to over 100 sessions per year (McGinley *et al.*, 1998).

In the study by Hornung *et al.* (2003), out of 483 users, 95% were exceeding the recommended exposure times. Also, 33% of users started their first tanning session at or above exposure times

recommended for users in the maintenance phase of tanning (>4.0 MED). The average duration of exposure on the first visit was 14.3 minutes (range, 3–30 minutes). Compilation of 15 common exposure schedules listed a suggested range of 2- to 15-minute sessions (average, 5.76 minutes) for the first week of tanning, with gradual increases over a 4-week or longer period to a range of 8- to 30-minute maintenance sessions (average, 20.5 minutes). The average period of tanning for each user was 6.3 weeks. Users spent approximately 43 minutes per week (range, 5–135 minutes) during an average of 2.4 sessions per week (0.25–7 sessions) (Hornung *et al.*, 2003).

(c) Wearing of goggles: In the 1991 study of high school students (Oliphant *et al.*, 1994), 59% reported always wearing goggles and 17% reported never wearing them. Those who reported longer usual tanning sessions were less likely to use goggles.

In the Scottish survey (McGinley *et al.*, 1998) 35% of users stated that they never or hardly ever wore protective goggles.

In the Canadian study (Rhainds *et al.*, 1999), 70% of 203 tanning bed users wore protective goggles during tanning sessions.

(d) Age restriction: In the US high school survey, almost 20% of those aged 14 years or younger reported using indoor tanning facilities, and half of the users had had their first session before age 15 years (Oliphant *et al.*, 1994).

Among 1405 adolescents under 16 years surveyed in the United Kingdom (Hamlet & Kennedy, 2004), 7% had used a sunbed in the last 6 months, of whom sixteen (17%) agreed that they used a sunbed regularly, i.e. twice a month or more. Of these 96 adolescent recent users, 61 (64%) reported using a sunbed in someone's house, and 23 (24%) had used a sunbed in a shop or salon.