

## The prevalence of current sunbed use and user characteristics: the SUN-Study 2008

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### Abstract

**Objectives** Although sunbed use is common in many developed countries, little is known about the characteristics of sunbed users.

**Methods** The SUN-Study 2008 (Sunbed-Use: Needs for Action-Study 2008) contains data on indoor tanning practices. It has a net sample size of 500 randomly selected 18–45-year-old adults living in Mannheim, Germany.

**Results** In this sample, current sunbed users were predominantly females, employed, had completed vocational school (or an equivalent certification), were smokers, participated primarily in individual sports and had skin types III or IV. The mean overall prevalence of sun bed use was 21.0%.

**Conclusions** Our results highlight specific potential risk factors for intervention that should be examined in other settings among different populations.

**Keywords** Germany · Health behavior · Risk factors · Skin · Sunbed use · Ultraviolet rays

### Introduction

The incidence of skin cancer continues to rise dramatically in developed countries (World Health Organization 2003). Many investigations have shown that exposure to ultraviolet radiation (UVR) increases the risk of skin cancer (Armstrong and Kricger 1993; World Health Organization 2003). In August 2009, the International Agency for Research on Cancer (IARC) raised the classification of the use of UV-emitting tanning devices to Group 1 (“carcinogenic to humans”) (El Ghissassi et al. 2009). Apart from sunlight itself, sunbeds are a common source of UVR exposure (International Agency for Research on Cancer 2005). Relatively little is known, however, about the individual characteristics associated with the use of indoor tanning facilities, even though this information would be helpful in developing interventions to reduce the health risks of UVR. This article reports on the prevalence of sunbed use from a recent epidemiological study and assesses the characteristics associated with current sunbed use in this sample.

### Methods

The data for our study were drawn from the cross-sectional SUN-Study 2008 (Sunbed-Use: Needs for Action-Study

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2008), a collaborative project conducted by the University of Heidelberg in cooperation with the Association of Dermatological Prevention (ADP) and the European Society of Skin Cancer Prevention (EUROSKIN). A population-based net sample of 500 adults (51.2% men) aged 18–45 years living in Mannheim, a major city with about 327,000 inhabitants in the south west of Germany, was obtained through a multistage sampling process and interviewed via telephone between February and May 2008. The telephone numbers were selected from the official telephone register of Mannheim, based on a random algorithm. The target subject was then defined as the person in the household whose birthday was the most recent (last birthday method). Approval of the ethics committee of the Medical Faculty of Heidelberg was obtained (ANr2007-269E-MA). The response rate was 38% from an overall sample of 1,316 individuals.

The dependent variable, “current sunbed use”, identified those who used a sunbed within the last 12 months ( $n = 105$ , 21.0%). The comparison group comprised individuals who reported never having used sunbeds ( $n = 267$ , 53.4%). Of these, 372 individuals met these criteria and were therefore included in our analysis. Excluded were persons having used a sunbed more than 12 months ago (so-called past user;  $n = 128$ , 25.6%).

Because the relative importance of each group of factors to current sunbed use is unclear, we used multivariate regression to assess their independent contribution. After weighting the data according to the population age and gender distributions in Mannheim, a logistic regression analysis was carried out. We selected six characteristics that showed statistical significance in bivariate analyses to represent these categories. Each was represented in our model using dichotomous indicator variables (0/1): female gender, employment status, previous vocational education (completed vocational school or something equivalent vs. lower or higher vocational education), regular smoking status, and skin type (types III and IV vs. types I and II according to the definition of Fitzpatrick 1975). In addition it should be mentioned that individuals with low and high vocational education were combined because of similar proportions of sunbed use. Furthermore, concerning skin type, individuals with skin type V or VI were not included in our sample. Age and some other factors, e.g., marital status, were excluded from this analysis because they were not significantly correlated with current sunbed use.  $P$  value  $<0.05$  was considered to be significant. All analyses were performed with SPSS for Windows, Version 16.0 (SPSS Inc., Chicago, IL, 60606, USA). The complete questionnaire can be received from the corresponding author.

## Results

The mean prevalence of current sunbed use was 21.0%. All bivariate results were supported by the logistic regression (Table 1): The adjusted odds ratio (AOR) for self-reported current sunbed use was significantly higher for women, those who had completed on-the-job-training, off-the-job-training or vocational school, and regular smokers. Furthermore, the AOR of sunbed use was higher among employed persons than among their unemployed counterparts. There was also a higher AOR of sunbed use associated with the type of sports activity engaged in by individuals. Persons doing individual sports like aerobics or strength training were more likely to be current sunbed users than those who did not engage in sports at all or those participating in team sports and martial arts. We also observed an independent association with current sunbed use among persons with skin types III and IV compared to those with paler skin types. Further analyses showed that 28.4% of ever users used a sunbed before their 18th birthday. Moreover, 41.5% of 18–25-year-olds, 48.6% of the 26–35-year-olds and 48.4% of the 36–45-year-olds were ever users.

## Discussion

We identified six characteristics independently associated with current sunbed use. Of these, female gender had the strongest association followed by skin type and current employment. Our findings, based on the SUN-Study 2008, which is the first population-based cross-sectional study about sunbed use in Germany, provide important details on potential risk factors in a country that has experienced a significant increase in skin cancer incidence over the last decades (Greinert et al. 2003; World Health Organization 2003). We would, however, like to emphasize that our study is only a pilot study for a nationwide investigation in Germany. Therefore, we do not claim that our findings are representative on a national level.

Our results are consistent with those of other studies and add several new insights. Previous work in other settings, for example, show that women (Amir et al. 2000; Bränström et al. 2004; Dissel et al. 2009; Ezzedine et al. 2008; Lazovich et al. 2004), smokers (Amir et al. 2000; Coups et al. 2008; Ezzedine et al. 2008), and persons with skin type III or IV are more likely to use sunbeds than their counterparts (Bränström et al. 2004; Dissel et al. 2009; Hoerster et al. 2007) and that there appears to be an association with physical activity (Coups et al. 2008). In addition to confirming these findings, we also observed that

**Table 1** Prevalence and odds ratios of characteristics associated with sunbed use among 18–45-year-old persons: the SUN-Study 2008

	Univariate analyses		Bivariate analyses Prevalence of current sunbed use		Logistic regression model Current user ( <i>n</i> = 105) versus never user ( <i>n</i> = 267)	
	Unweighted ( <i>n</i> )	Weighted proportion (%)	Chi-square <i>P</i> value	Adjusted odds ratios	95% CI	
Demographic and socioeconomic characteristics						
Gender						
Female	312	26.6	<0.001	3.5	(2.09; 5.88)***	
Male <sup>a</sup>	188	16.0				
Currently employed						
Yes	366	23.7	0.024	2.0	(1.04; 3.72)*	
No <sup>a</sup>	134	13.7				
Vocational education						
Medium <sup>b</sup>	221	27.5	<0.001	1.8	(1.09; 2.98)*	
Low or high <sup>a</sup>	276	16.5				
Lifestyle characteristics and skin type						
Smoker						
Regular	119	26.8	0.050	1.8	(1.04; 3.24)*	
None or occasional <sup>a</sup>	381	19.1				
Sport activity						
Individual sports	252	24.4	0.072	1.8	(1.09; 3.06)*	
None or other sports <sup>a</sup>	248	17.4				
Skin type						
III or IV	310	25.3	0.005	2.6	(1.47; 4.53)**	
I or II <sup>a</sup>	190	13.5				
Mean prevalence		21.0				
<i>r</i> <sup>2</sup> adjusted <sup>c</sup>				0.192		
<i>n</i>				361		

<sup>a</sup> Reference category

<sup>b</sup> Medium vocational education describes persons having completed on-the-job-training, off-the-job-training or vocational school

<sup>c</sup> *r*<sup>2</sup> according to Nagelkerke

\*\*\* *P* < 0.001, \*\* *P* < 0.01, \* *P* < 0.05

the less frequently studied variable, type of sports activity, was also important. Specifically, persons doing individual sports reported using sunbeds more regularly when compared to those engaged in team sports, martial arts or no sports. This may be a very relevant point given that there are often sunbeds in sports facilities. Additionally, although a negative correlation between education and the use of sunbeds has been reported (Bränström et al. 2004; Dissel et al. 2009), we assessed its association with a measure representing a different type of education (i.e., vocational training) and found it to be significant. Furthermore, we identified a correlation between employment status and sunbed use, which has not yet been reported in other studies. This observation may reflect limited time for outdoor sunbathing and therefore a higher predisposition to using artificial sources to tan their skin.

Our results identify several potential new targets for interventions to reduce UV light-related skin damage and cancers. Because sunbeds are mainly used by women and employed persons, interventions targeting occupations in which women predominate (e.g., in nursing services) may be valuable. Another venue for preventive interventions may exist in gyms given the higher adjusted odds of sunbed use among persons engaging in individual sports compared with others less likely to use these facilities. Age could not be identified as influencing sunbed use. This result may be explained by our sample: we included only 18–45-year-old individuals, who seem to be a very homogenous group. Potentially, a difference could appear in comparison of this age group with younger or older individuals.

The strength of our study lies in the population-based sample selection. This is important because there are no

similar studies on German sunbed users. There is one study from North Rhine-Westphalia, a federal state of Germany, in which persons filled in a questionnaire during skin cancer screening campaigns (Dissel et al. 2009). However, this study contained only voluntary participants of these campaigns, and therefore persons who care about their health. Another study took place in the German-speaking part of Switzerland that surveyed tanning salon visitors when they left the salon (Mathys et al. 2002). As a consequence, current sunbed users were overrepresented. This was not the case in our study. We also included never users to be able to make comparisons. This approach results in in-depth analyses. Another strength of the study is the 4-month data-attainment period that served to compensate seasonal effects at least partly. In comparison to other studies, this is an advantage because seasonal effects have rarely been taken into consideration.

Our results should be interpreted within the context of several limitations, which mainly concern the selection of the investigated region, the response rate, and the cross-sectional design. Mannheim is a typical German city with a demographic structure comparative to that of the German-wide population structure. While our results cannot be generalized outside this setting, they provide a useful indication of the use of sunbeds in this geographical region and help to identify risk groups. The relatively low response rate is a second concern. It is possible, however, that sunbed users were more willing to answer the questions than never users. This cannot be clarified because we did not carry out a non-responder analysis. Nevertheless, to reduce this potential selection bias, we weighted the data according to the age and gender structure in Mannheim. Finally, the cross-sectional nature of our analyses does not support causal inferences. For instance, the assertion that occupation status or the types of sports practiced are responsible for sunbed use cannot be made. For the majority of users, however, these are significant associations.

This study is, to our knowledge, the first population-based study to report on the characteristics of sunbed users in Germany. As such, it offers important information on those at greatest potential risk, provides guidance on the development of future-targeted interventions and justifies further studies on characteristics associated with this important contributor to skin damage and cancers.

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