

# Ten-year changes in sun protection behaviors and beliefs of young adults in 13 European countries

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## Abstract

**Objective.** Sun protection behaviors are important to the prevention of skin cancers, but little is known about changes over time in attitudes and behavior.

**Methods.** Cross-sectional surveys were carried out among university students in thirteen European countries in 1990 ( $n=10,241$ ) and 2000 ( $n=10,161$ ). Sun protection behavior and beliefs about the importance of sunscreen use for health were measured.

**Results.** There was little change in the proportion of men and women who sunbathed, but use of sun protection increased over the 10-year interval from 52% to 63% in men and 80% to 87% in women. There was wide variation in sun protection use and strength of health beliefs between countries. The association between strength of beliefs and behavior was more marked in 2000 than 1990. Sun protection behavior was positively associated with the socioeconomic background of participants.

**Conclusion.** The use of sunscreen increased among educated young Europeans from several countries over the 1990s, but important sex differences remain. Awareness of the risk to health of unprotected sunbathing is high, but there is scope of strengthening attitudes to sunscreen use.

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## Introduction

There has been an increased incidence of both melanoma and non-melanomatous skin cancer in many countries over recent years. In Europe, melanoma is less prevalent than in the USA and Australia, but mortality and incidence rates vary widely between countries. For example, the age-standardized melanoma incidence rate per 100,000 in Greece in 2000 was 2.3 for men and 2.6 for women, compared with 11.9 for men and 15.4 for women in The Netherlands (Toms, 2004). The increase in melanoma mortality appears to have leveled off over recent years in Western Europe, but in Southern and Eastern Europe, it is still increasing (de Vries et al., 2003; Bosetti et al., 2004). Exposure to ultraviolet (UV) radiation is the main cause of melanoma and contributes to other skin cancers (Armstrong and Kricke, 1993), so sun protection represents a major public

health challenge (Eide and Wienstock, 2006). In some countries, public health campaigns have attempted to educate the population about the dangers of UV radiation exposure, for example, the 'SunSmart' campaign run by Cancer Research UK, and the Environmental Protection Agency's SunWise School Program in the USA. But several affluent countries do not appear to have large-scale national programs to promote sun safety (Severi et al., 2000).

Knowledge about sun protection behaviors such as sunscreen use is generally high in Western populations (Mackie, 2004) but is not consistently related to sunscreen use (Jerkegren et al., 1999; Guile and Nicholson, 2004). Social norms and attitudes are more important determinants of sunscreen use, with cosmetic motives such as desire for a tan competing with health-related beliefs about cancer prevention (Bränström et al., 2001; Kristjansson et al., 2004). Little is known about trends over recent years in sunscreen use and beliefs in the importance to health of sun protection. This study analyzed data on sun protection behavior and beliefs collected from university

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students from thirteen European countries in 1990 and 2000. Because sun exposure in early life may be a greater risk for the development of melanoma than equivalent exposure in later adult life (Autier and Dore, 1998), the sun protection practices of young adults are of considerable interest. This international dataset permits comparisons in trends between countries and allowed us to investigate the consistency of associations between health-related beliefs and behaviors. We also analyzed the relationship between sunscreen use and socioeconomic background, as defined by parental education and family wealth.

## Methods

### Study design and sample

The European Health Behavior Survey (EHBS) was carried out in 21 European countries between 1989 and 1991 (Step toe and Wardle, 1996). The International Health Behavior Survey (IHBS) used measures based on the EHBS and was carried out in 24 countries between 1999 and 2001 (Step toe et al., 2002a). The data presented here are from the 13 European countries included in both studies (Belgium, England, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, The Netherlands, Poland, Portugal and Spain) as described previously (Step toe et al., 2002b). Results from the EHBS are referred to as 1990 data, and results from the IHBS are referred to as 2000 data.

The questionnaire used for data collection was developed in English then translated into the language of each participating country. The development of questionnaire items and their reliability has been detailed in previous publications (Wardle and Step toe, 1991; Step toe et al., 1995). Data were

collected by collaborators working in universities across Europe from classes of students studying non-health-related courses. Students were told that the survey concerned activities related to health and that an international comparison was being carried out. The same universities took part in the two surveys. Although completing the questionnaire was voluntary, participation rates in most countries were over 90%. Sample sizes varied across countries depending on time constraints and the interests of collaborating groups, but altogether 10,352 participated in 1990 and 10,301 in 2000. Analyses were restricted to students aged between 17 and 30. The number of participants in each country is shown in Table 1.

### Measures

Sun protection use was established with the question ‘When you sunbathe, do you use sun protection, sunscreen cream or lotion’. Answers were ‘Yes’, ‘No’ or ‘I never sunbathe’. Health beliefs were assessed by asking respondents how important they felt it was for health to use sunscreen when sunbathing. Respondents rated their beliefs on a 10-point scale, where 1 = ‘of very low importance’ and 10 = ‘of very great importance’.

Questions concerning socioeconomic background were asked in the 2000 IHBS survey only. Information about the educational attainment of both parents was collected, and the sample was subsequently divided into lower parental education (neither parent went to college or university) and higher parental education (one or both parents went to college or university). Family wealth was assessed by asking respondents to categorize their family background as wealthy (within the highest 25% in your country in terms of wealth), quite well-off (within the 50–75% range for your country), not very well-off (within the 25–50% range for your country) or quite poor (within the lowest 25% in your country in terms of wealth). The population was subsequently divided into less wealthy (not very well off and quite poor) and more wealthy (wealthy, quite well off) categories.

Table 1  
Sunbathing, use of sun protection and strength of health beliefs in each country in 1990 and 2000

Country	Year	Mean age	n	Proportion who sunbathe (%)		Proportion using sun protection when sunbathing (%)		Strength of health beliefs (1–10)	
				Men	Women	Men	Women	Men	Women
Belgium	1990	19.0	1193	69	89	57	82	5.0	6.4
	2000	19.2	527	68	94	65	82	5.6	7.0
England	1990	20.1	704	73	79	70	88	5.9	7.3
	2000	19.8	786	68	79	76	91	6.6	7.9
France	1990	21.4	650	89	93	52	78	5.3	6.7
	2000	19.8	763	88	90	53	81	6.0	7.3
Germany	1990	23.6	779	92	94	80	90	6.3	7.6
	2000	22.5	727	88	95	74	90	6.9	8.3
Greece	1990	20.7	651	82	91	37	84	6.4	7.8
	2000	21.2	793	82	92	61	91	7.0	8.4
Hungary	1990	20.8	748	91	98	51	72	5.6	6.9
	2000	21.8	588	79	95	54	81	6.2	7.6
Iceland	1990	21.2	789	76	91	41	68	5.5	6.8
	2000	21.1	676	78	95	54	76	6.1	7.5
Ireland	1990	19.0	760	74	88	71	85	6.6	7.9
	2000	18.8	436	77	94	86	96	7.2	8.6
Italy	1990	19.6	810	95	98	48	78	5.8	7.2
	2000	20.2	2018	90	97	55	84	6.5	7.8
Netherlands	1990	19.6	744	91	73	48	78	5.1	6.5
	2000	21.1	682	81	94	73	92	5.8	7.2
Poland	1990	21.8	787	88	96	51	88	5.7	7.1
	2000	20.9	740	89	94	63	89	6.3	7.7
Portugal	1990	22.1	838	93	97	49	82	6.6	8.0
	2000	21.1	942	90	99	69	91	7.2	8.6
Spain	1990	20.7	791	89	97	28	69	6.0	7.3
	2000	20.9	483	81	96	60	88	6.6	8.0
Total	1990	20.6	10,241	84	92	53	80	6.0	7.0
	2000	20.6	10,161	83	94	63	87	6.3	7.9

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