

## COMMENTS AND OPINIONS

### Safe in the Sun: Low Prevalence of Sunburns and a High Use of Sun Protection Measures in Bavarian Preschool Children

The prevalence of sunburns, an established risk factor for skin tumors, and the use of sun protection measures were assessed during the 2003 school entrance examinations in 7263 children in Bavaria, Germany.<sup>1</sup> Three aspects of sunburn prevalence were ascertained: lifetime experience (ever), recent events (last 12 months), and severity (blistering). The skin phototype was assessed by questions on freckling, eye color, and individual experiences with skin reaction to UV exposure. Sun protection attitudes were categorized by use of sunscreens, sun caps or hats, and/or textiles and avoidance of sun exposure during the UV-intensive hours. We also asked for the number of hours spent outdoors during a usual summer day.

**Table 1. Prevalence of Potential Risk and Protective Factors for Any Sunburn**

| Sun Exposure Behavior  | Respondents, %<br>(95% CI) |
|--|----------------------------|
| Use of sunscreens (n = 7044)                                   |                            |
| Never-sometimes  | 10.4 (9.7-11.1)            |
| Frequently   | 21.8 (20.9-22.8)           |
| Every time   | 67.8 (66.7-68.9)           |
| Use of sun caps/hats and clothing (n = 7030)                   |                            |
| Never-sometimes  | 14.1 (13.3-15.0)           |
| Frequently   | 23.8 (22.8-24.8)           |
| Every time   | 62.1 (61.0-63.3)           |
| Avoidance of sun exposure/seeking of shade (n = 7051)          |                            |
| Never-sometimes  | 18.2 (17.3-19.1)           |
| Frequently   | 48.0 (46.8-49.2)           |
| Every time   | 33.8 (32.7-34.9)           |
| Average No. of hours spent outdoors on a summer day (n = 7071) |                            |
| 0-2  | 12.2 (11.5-13.0)           |
| 2-4  | 51.2 (50.1-52.4)           |
| >4   | 36.5 (35.4-37.7)           |

Abbreviation: CI, confidence interval.

**Table 2. Prevalence of or Risk for Any Sunburn**

| Characteristic  | Prevalence, %<br>(95% CI) | Odds Ratio (95% CI) |                      |
|---|---------------------------|---------------------|----------------------|
|   |                           | Crude               | Adjusted             |
| Sex   |                           |                     |                      |
| Female  | 30.6 (28.9-32.3)          | 1.00 (Reference)    | 1.00 (Reference)     |
| Male  | 33.3 (31.6-34.9)          | 1.13 (1.02-1.26)    | 1.19 (1.06-1.33)*    |
| Parents' school education                                     |                           |                     |                      |
| <10 y   | 36.1 (33.7-38.6)          | 1.00 (Reference)    | 1.00 (Reference)     |
| ≥10 y   | 30.5 (29.2-31.9)          | 0.78 (0.69-0.88)    | 0.75 (0.66-0.85)*    |
| Skin phototype  |                           |                     |                      |
| IV  | 4.1 (2.5-6.2)             | 1.00 (Reference)    | 1.00 (Reference)     |
| III   | 28.5 (26.8-30.2)          | 9.37 (6.01-14.61)   | 9.70 (6.21-15.14)*   |
| I/II  | 41.0 (39.1-42.9)          | 16.35 (10.49-25.48) | 18.19 (11.64-28.41)* |
| Sun protection  |                           |                     |                      |
| Use of sunscreens   |                           |                     |                      |
| Every time-frequently   | 30.5 (29.1-32.0)          | 1.00 (Reference)    | 1.00 (Reference)     |
| Sometimes-never   | 35.0 (32.8-37.1)          | 1.22 (1.09-1.37)    | 1.22 (1.08-1.39)*    |
| Sun caps/hats and clothing                                    |                           |                     |                      |
| Every time-frequently   | 30.0 (28.5-31.5)          | 1.00 (Reference)    | 1.00 (Reference)     |
| Sometimes-never   | 35.0 (33.1-37.0)          | 1.26 (1.13-1.40)    | 1.26 (1.11-1.43)*    |
| Avoidance of sun/seeking of shade                             |                           |                     |                      |
| Every time-frequently   | 28.7 (26.7-30.8)          | 1.00 (Reference)    | 1.00 (Reference)     |
| Sometimes-never   | 33.6 (32.1-35.1)          | 1.25 (1.12-1.41)    | 1.16 (1.02-1.32)*    |
| Average No. of hours spent outdoors during a usual summer day |                           |                     |                      |
| 0-2   | 28.3 (24.9-31.8)          | 1.00 (Reference)    | 1.00 (Reference)     |
| 2-4   | 30.7 (29.1-32.4)          | 1.13 (0.94-1.35)    | 1.15 (0.95-1.39)     |
| >4  | 34.8 (32.8-36.8)          | 1.35 (1.12-1.63)    | 1.43 (1.17-1.73)*    |

Abbreviation: CI, confidence interval.

\*Statistically significant difference.

A total of 7263 questionnaires from children of German nationality were collected (return rate 85.3%). The children's mean age was 5.61 years. Any sunburn during the first 6 years of life was reported for 31.5% of children (95% confidence interval [CI], 30.4%-32.5%), and 3.3% of these were bullous sunburns (95% CI, 2.3%-4.5%). The mean number of sunburns in children experiencing at least 1 was 1.75, and 5.4% had more than 3 sunburns. The use of sunscreens and textiles was above 80%, and most children spent 2 to 4 hours outdoors in the summer (**Table 1**).

In a multivariate analysis, fair skin type (I/II>III>IV) and more than 4 hours of outdoor activities per day were independent risk factors for "any sunburn" (**Table 2**). Nonbehavioral protective factors of sunburn were female sex and higher educational level of the parents.

The present data show a high acceptance of sun protective measures and low rates of sunburn in preschool children, thus pointing out the efficacy of sun protection measures and also the importance of male sex and prolonged outdoor activities as additional risk factors for sunburns in preschool children.

The lifetime prevalence of sunburn in children was similar to recently published German data<sup>2</sup> and considerably lower than that found in a recent pan-European study<sup>3</sup> that reported at least 1 sunburn in 54% of children in a similar age group or compared with 62% reported previously in Australia.<sup>4</sup>

The lower prevalence in Bavarian children might be due to climatic differences or better protection than in other countries. However, given the high proportion of children subject to an array of different sun protection measures, these measures are likely to be instrumental. A role for lower sun intensity in Germany is unlikely since the number of children who had not experienced sunburns by age 6 years in Germany has increased from 38.6% in 1993-1994 to 68.5% in our study.<sup>5</sup> This can hardly be explained by climatic changes and might rather be an indicator of the increasing effectiveness of ongoing sun prevention programs, eg, the Bavarian campaign "Sonne(n) mit Verstand" ([www.sonne-mit-verstand.de](http://www.sonne-mit-verstand.de)).

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## Children With Red Hair Have More Freckles but Fewer Melanocytic Nevi: Results From a Cohort Study of 280 Three-Year-Olds

We examined the relationships between hair color, freckling, and mole count in a cohort of 280 children aged 3 years.<sup>1</sup> Physical examinations of the children, including assessment of eye color (visual assessment), hair color (wigmaker sample matching), and degree of freckling (visual assessment and matching with graphic representations of freckling on the face, upper back, and arms) were conducted between June 1, 2001, and August 31, 2001. Nevus count, size, and location were recorded by 1 of 3 dermatologists or 1 specially trained pediatrician using previously validated procedures.<sup>2</sup> Sun protection habits were assessed in parent interviews and compiled into a composite sun protection scale score.<sup>3</sup>

Of 280 children, 11 (4%) had red hair and 42 (15%) had freckles (**Table 1**). Children with red hair had significantly fewer moles compared with other children (mean 2.1 vs 6.1;  $P = .001$ ). Freckling was associated with red hair: 64% of red-haired children (7 of 11) had freckles vs 13% of children with other hair colors (35 of 269) ( $P < .001$ ). In children with hair colors other than red, freckling was associated with increased number of melanocytic nevi (mean, 7.4 vs 5.9 among freckled vs non-freckled children;  $P = .046$ ); however, this association was not found among red-haired children (mean, 2.1 vs 2.0 with freckling vs no freckling;  $P = .93$ ) (**Table 2**).

These results reveal a complex interaction of phenotypic traits associated with increased melanoma risk. While nevus count remains predictive of melanoma risk regardless of hair color, the development of nevi in red-haired children may be fundamentally different than in children with other hair colors such that nevus count may less precisely predict melanoma risk in red-haired children. Even as early as age 3 years, children with red hair have both more freckling and fewer nevi compared with children with other hair colors. In red-haired children, freckling is not associated with the number of nevi, whereas in children with other hair colors, freckling is associated with more nevi.

Red hair and freckles are associated with mutations in the melanocortin-1 receptor (*MCI-R*) gene. Red hair is uncommon in people who are not homozygotes or compound heterozygotes for *MCI-R* polymorphisms and extremely rare in people with wild type *MCI-R*.<sup>4,5</sup> Freckles may be seen in approximately 62% of people with at least 1 *MCI-R* variant and 16% of people who have wild type *MCI-R*.<sup>6</sup> *MCI-R* polymorphisms have also been shown to increase melanoma risk independent of skin color, hair color, and freckling.<sup>4,7,8</sup> Although *MCI-R* mutations have been detected in nevi,<sup>9</sup> polymorphisms in the *MCI-R* gene