

Title: Are Australians using sunscreen and other sun protection behaviours effectively?

Tamara Tabbakh¹, Suzanne Dobbinson¹

1. Cancer Council Victoria

Abstract Although daily sunscreen use is preventive when used regularly in the context of research trials, there is limited research examining the extent to which the general population can use sunscreen effectively in practice/daily life. The National Sun Protection Survey provides comprehensive data on the skin cancer prevention behaviours of Australians aged 12-69 years, with which to examine this research question. The current study aimed (1) to briefly describe the prevalence and context of sunscreen use among Australians during their time outdoors in peak UVR hours on summer weekends; and (2) to examine the relationship between body parts protected (by sunscreen alone versus clothing or hat protection to specific body parts) and sunburn outcomes. Analyses showed that less than half of respondents had used sunscreen when outdoors on summer weekends in 2016-17. Application of sunscreen was less than ideal and often did not cover all exposed skin, and a maximal protection sunscreen was less commonly used. Multivariable analyses predicting weekend sunburn outcomes showed that clothing protection to the trunk was associated with lower odds of sunburn. Staying mainly under shade also was associated with lower odds of sunburn. However, sunscreen alone (with swimwear only) applied to the upper body was less effective and was associated with increased odds of sunburn. In conclusion, despite widespread use, many sunscreen users are not applying sunscreen with sufficient diligence to prevent sunburn. More education on best practice is needed.

Introduction

Sunscreen is the only behavioural measure with proven evidence to reduce squamous cell carcinoma and melanoma. Evidence from a randomised controlled trial (RCT) in Nambour, Queensland, Australia, indicates that daily sunscreen use reduces skin cancer risk (van der Pols et al. 2006; Green et al. 1999; Green et al. 2011). This trial found daily sunscreen use was associated with a reduction of squamous cell carcinoma (Rate Ratio: 0.62, 95% confidence intervals (CI) 0.38-0.99) and melanoma, especially invasive melanoma (HR: 0.27, 95%CI 0.08-0.97). However, sunscreen use has also been shown to be associated with an increase in UV exposure. An RCT of young adults on holiday in France found that use of higher SPF sunscreen resulted in extended UVR exposure, when sunscreen is used during sunbathing in pursuit of a tan (Autier et al. 1999). Although safety of sunscreen ingredients has been questioned these are considered safe to use (Mancebo et al. 2014), and sunscreen is one of the most commonly used forms of sun protection among Australians.

The extent to which the general population can use sunscreen effectively to prevent sunburn is not well-documented. This study examines the relative protection from sunburn provided by Australians' use of sunscreen, compared with other sun protective behaviours on summer

weekends. Uniquely the location on the body where the sunscreen and/or clothing/hat was applied/used is considered in these analyses.

Methods

The National Sun Protection Survey (NSPS) has been conducted approximately triennially since 2003. In 2016-17, N=894 adolescents (12-17 years) and N=3,614 adults (18-69 years) residing in Australia were interviewed in a series of weekly cross-sectional telephone interviews over summer. Quotas were used to achieve a nationally representative sample. The NSPS includes comprehensive skin cancer prevention related measures. Respondents reported their use of sunscreen, including the parts of the body it was applied to, together with their use of clothing and hats, and sunburn occurrence on the previous Saturday and Sunday when outdoors during 11am-3pm. Descriptive statistics were used to examine the prevalence of sunscreen use. Multivariable logistic regression analyses, were used to examine the relationships between body parts protected (via sunscreen use and use of covering clothing/hats, with shade use) and sunburn outcomes among sunscreen users outdoors in a metropolitan area adjusting for demographics, respondent skin type, and UV levels recorded relevant to the time and location of the respondents' outdoor activities.

Results

The prevalence of sunscreen use (SPF15+) was similar among adolescents (40%) and adults (42%) who were outdoors on the weekend. Among adults 49% of women and 33% of men who were outdoors had used sunscreen on the previous weekend, with little difference in prevalence of use by gender among adolescents. Fewer respondents had used a sunscreen with a sun protection factor of 50+ on the weekend (see Figure 1). Among those respondents who had applied sunscreen on the weekend, sunscreen was most commonly applied to the face (adolescents: 45%; adults: 41%) followed by the arms (adolescents: 37%; adults: 29%) and neck (adolescents: 31%; adults: 28%). Adolescents more commonly applied sunscreen to the legs (28% c.f. 17% of adults). Most sunscreen users applied sunscreen before going outdoors (adolescents: 95%; adults: 94%).

Weekend sunburn was inversely related to protection of the trunk with clothing (odds ratios (OR): adolescents 0.16 [95% CI, 0.04-0.63] adults 0.50 [95% CI, 0.25-0.99]) and staying mainly under shade (OR: adolescents 0.18 [95% CI, 0.07-0.50], adults 0.42 [0.27-0.65]). Analyses additionally considered whether only sunscreen was applied to the upper body or not. These models found a significant increase in the odds of sunburn associated with use of sunscreen on the upper body among adolescents (OR 3.25 [95% CI, 1.50-7.05]), but not adults (OR 0.91 (95% CI

0.64-1.29). Consistent with these findings, sunscreen misapplication was commonly cited as a reason for sunburn (Table 1), particularly among adolescents (45% c.f. 27% of adults).

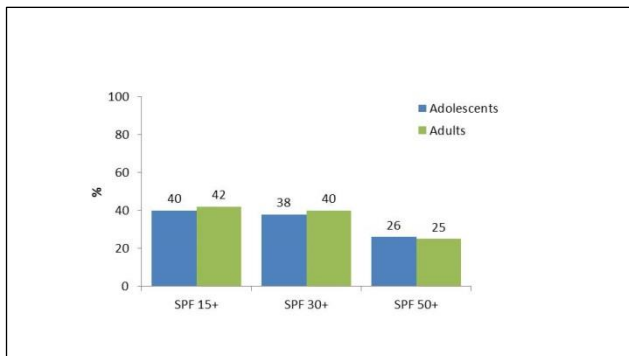


Figure 1. Prevalence of sunscreen use on summer weekends among Australians in 2016-17.

	Sunburnt adolescents N=230 (%)	Sunburnt adults N=598 (%)
Sunscreen wore off, burnt through sunscreen, or missed area while applying	45	27
Stayed in sun too long or sunny/hot day	32	37
Didn't think needed to protect or forgot to protect	24	33
Didn't use or wear sunscreen	11	17
Could not be bothered or tried to get a suntan	6	11

Table 1. Self-reported reasons for sunburn on summer weekends among Australians in 2016.

Discussion

Despite widespread use and increased use among adults in recent years, there is still scope to increase Australians' use of sunscreen, especially among men. However, many Australians using sunscreen while outdoors on summer weekends are not using it effectively. Reliance on sunscreen alone for protection commonly results in sunburn, while staying under shade is associated with less sunburn. Given that sunscreen use during intentional tanning results in extended sun exposure (Autier et al. 1999), this may partially explain the observed increase in weekend sunburn incidence among Australians relying on sunscreen only. Additionally, poor application is also likely to be a factor in their increased odds of being sunburnt on summer weekends. More education on best practice is needed.

Conclusions

- Sunscreen use among the general population without use of other sun protection methods resulted in increased sunburn among Australians in summer 2016-17.
- Strategies to improve Australians' knowledge in mode of application are needed to maximise the potential of this efficacious prevention measure.

References

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