

Response to P. Autier and M. Boniol regarding our article—Relationship between sunbed use and melanoma risk in a large case–control study in the United Kingdom

Faye Elliott, Jennifer H. Barrett, D. Timothy Bishop, and Julia A. Newton-Bishop

Section of Epidemiology and Biostatistics, Leeds Institute of Molecular Medicine, University of Leeds, Leeds, United Kingdom

Dear Editor,

Autier and Boniol¹ have raised a number of issues with respect to our recent letter,² in which we reported a case–control study of melanoma which showed no evidence of a strong association between sunbed usage and risk of melanoma. They question whether the design was adequate to examine the association between lifestyle factors and risk of melanoma. The basis of the argument was to question whether the control selection could be considered as population-based.

In our study, we recruited controls *via* the population registers of the family doctors (GPs) caring for the cases, which is one of the most established methods of conducting population-based case–control studies in countries, such as the UK, where this is possible. In the UK, individuals can only register with GPs who are geographically located in the same small district of residence and therefore selecting for controls in this way reduces the possibility of a number of biases. The GPs approached potential controls on the basis of age and sex only. In a previous article published from our case–control study,³ we gave details of the response rate and the age and socio-economic imbalance between cases and controls. The control response rate of 55% in our study, although lower than ideal, is not atypical. Participation bias is a limitation of essentially all case–control studies, and we acknowledged this limitation in the main manuscript. Young controls were difficult to recruit, and in the discussion we state that the excess of older controls and the socio-economic imbalance are likely due to participation bias.

Galea and Tracy⁴ found that participation rates in epidemiological studies have been steadily decreasing in recent years and that controls are more difficult to recruit than cases. For example, the median response rates from the Behavioral Risk Factor Surveillance Survey, conducted by the Centers for Disease Control and Prevention in the USA, were 71.4% in 1993, 48.9% in 2000, 51.1% in 2005 and 54.6% in 2010.⁵ In a recent comparison of two Australian case–control studies a decline in participation rates of eligible controls over time was also observed; the rates were 69.1% in 2003 and 49.1% in 2010.⁶ Reassuringly, Galea and Tracy reported that most studies found little evidence for substantial bias as a result of non-participation.

In a recent meta-analysis, Boniol *et al.*⁷ showed that sunbed usage is a risk factor for melanoma; we found no evidence of an association, although as we stated in the

letter this only allows us to exclude a strong association. In relation to possible bias in our study, we have considered whether our control sample differed from the population in a way that might bias results. We recruited controls of a slightly higher socio-economic status, but in a recent systematic review by Schneider and Krämer⁸ no clear relationship between socio-economic status or educational level and sunbed use was found, and indeed we saw no such association in our study. Schneider and Krämer reported there to be higher sunbed use among younger individuals, which was also reflected in our study. We see no reason to believe that our control group would have lifestyles “not at all reflecting” habits in the general population, and in particular that they would have a higher sunbed usage than the general population. Schneider and Krämer’s systematic review showed that sunbed users were more likely to be younger, to be less aware of the risks of sun exposure and to adopt risky behavior. This does not support the view that our control sample, who may be slightly older and of higher socio-economic status because of participation bias, has led to an over-estimate of sunbed use in the general population.

We recruited more cases than controls in order to enhance power for studies of prognosis, but this has no bearing on the appropriateness of the design for studying lifestyle factors.

In summary, while acknowledging that our case–control study shares the limitations inherent in any such study design, we see no reason to believe bias has had a major effect on the risk estimates, and in particular no evidence that these are biased toward the null.

Yours sincerely,
Faye Elliott
Jennifer H. Barrett
D. Timothy Bishop
Julia A. Newton-Bishop

References

1. Autier P, Boniol M. Relationship between sunbed use and melanoma risk in a large case–control study in the United Kingdom. *Int J Cancer* 2012 Sep 17. doi: 10.1002/ijc.27848.
2. Elliott F, Suppa M, Chan M, et al. Relationship between sunbed use and melanoma risk in a large case–control study in the United Kingdom. *Int J Cancer* 2012;130:3011–13.
3. Newton-Bishop JA, Chang YM, Elliott F, et al. Relationship between sun exposure and melanoma risk for tumours in different body sites in a large case–control study in a temperate climate. *Eur J Cancer* 2011;47:732–41.
4. Galea S, Tracy M. Participation rates in epidemiological studies. *Ann Epidemiol* 2007;17:643–53.

5. Centers for Disease Control and Prevention (CDC). Behavioural risk factor surveillance system: 2010 summary data quality report. Available at: http://www.cdc.gov/brfss/technical_infodata/quality.htm. Accessed August 10, 2012.
6. Mazloum M, Bailey HD, Heiden T, et al. Participation in population-based case-control studies: does the observed decline vary by socio-economic status? *Paediatr Perinat Epidemiol* 2012;26:276–9.
7. Boniol M, Autier P, Boyle P, et al. Cutaneous melanoma attributable to sunbed use: systematic review and meta-analysis. *BMJ* 2012;345:e4757.
8. Schneider S, Krämer H. Who uses sunbeds? A systematic literature review of risk groups in developed countries. *J Eur Acad Dermatol Venereol* 2010;24:639–48.

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Correspondence to: Faye Elliott, Section of Epidemiology and Biostatistics, Leeds Cancer Research UK Centre, Leeds Institute of Molecular Medicine, Cancer Genetics Building, St James's Hospital, Beckett Street, Leeds LS9 7TF, United Kingdom, Tel.: +44-113-2066970, Fax: +44-113-2340183, E-mail: f.elliott@leeds.ac.uk