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diabetes in the past 30 years. Because methods for glycaemic control and the delivery of insulin therapy have improved over time, the proportion of people admitted with diabetes whose condition is difficult to control is unlikely to have increased. Survival of young people with type 1 diabetes whose disease was serious enough to warrant admission is therefore not likely to have improved much.

Leicester Gill, Glenys Bettley, and Myfanwy Griffith built the database. We thank Myfanwy Griffith and David Yeates for programming.

Contributors: SER and MJG designed the study and wrote the first draft of the manuscript; SER analysed the data; and HAWN contributed to study design, interpretation, and further drafts. SER and MJG are guarantors for the paper.

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Competing interests: None declared.

Ethical approval: The historical data files were built with approval from the Oxford Region Data Protection Steering Group and the Health Authorities' Caldicott Guardians; and are wholly anonymised. Ethical approval was not needed for analysis of anonymised statistical datasets.

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## Does the type of competing interest statement affect readers' perceptions of the credibility of research? Randomised trial

Sara Schroter, Julie Morris, Samena Chaudhry, Richard Smith, Helen Barratt Topic: 344;215;166

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Financial relationships among industry and academic institutions are diverse and common.<sup>1</sup> These interests can influence authors' conclusions<sup>2</sup> and readers' perceptions of published studies.<sup>3</sup> We report the effects on reader perceptions of different statements of competing interests for two manuscripts.

### Participants, methods, and results

We used computer generated random numbers from the British Medical Association's membership database (to select 900 BMJ readers). We randomised 450 to be sent a paper about the use of problem lists in letters between hospital doctors and general practitioners<sup>4</sup> (problem lists paper) and 450 to be sent a paper indicating that the impact of pain from herpes zoster on patients' daily functioning may be substantial (herpes paper).<sup>5</sup> We previously reported a study using the herpes paper,<sup>3</sup> and we have incorporated the results from that study in this paper. For each of the papers, 150 readers received the paper with no competing interests declared, 150 with a financial statement, and 150 with a statement that the author was a recipient of funding for studentships and research grants.


The competing interest statements for each group were as follows. For both papers, when the type of competing interest was "none," the phrasing of the statement was "none declared."

For the herpes paper, when the type of competing interest was "financial," the statement read "The authors are employees of Tohen Research Laboratories, Tohen and Co, Inc, Connecticut, and potentially own stock and/or hold stock options in the company. When the type of competing interest was "grant," the statement

read "KH is a recipient of funding for studentships and research grants from Tohen Laboratories Limited."

For the problem lists paper, when the type of competing interest was "financial," the statement read: "AT is an employee of Tohen Laboratories Limited, makers of medical management software and potentially owns stock or holds stock options within the company." When the type of competing interest was "grant," the statement read: "AT is a recipient of funding for studentships and research grants from Tohen Laboratories Limited, makers of medical management software."

Readers scored the studies in terms of interest, importance, relevance, validity, and believability on 5 point scales (for example, 1 = extremely uninteresting to 5 = extremely interesting). We estimated that 91 readers were needed in each group to achieve a power of 90% to detect a meaningful difference in scores between the groups of approximately 0.5 units (characterised by a variance of means of 0.047—for example, means of 3.3, 3.4, and 3.8), by using a one way analysis of variance with the conventional 5% significance level and assuming a common standard deviation of 1.0. We used an analysis of variance model to evaluate the impact of type of competing interest (none declared, financial, grants) on ratings of interest, importance, relevance, validity, and believability and to assess the influence of type of paper (herpes, problem

 Full details of the results for each paper and the interaction effects are on bmj.com

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Analysis of variance results: mean values (95% confidence intervals) and significance levels relating to competing interest

Scored variable	Competing interest			P value
	None declared (n=174)	Financial statement (n=192)	Grants statement (n=156)	
Interest	3.21 (3.07 to 3.35)	3.06 (2.93 to 3.20)	3.26 (3.11 to 3.41)	0.12
Importance	3.29 (3.15 to 3.43)	3.03 (2.90 to 3.17)	3.16 (3.01 to 3.31)	0.035*
Relevance	3.44 (3.29 to 3.60)	3.13 (2.99 to 3.27)	3.35 (3.19 to 3.52)	0.009*
Validity	3.16 (3.01 to 3.30)	2.82 (2.69 to 2.96)	3.12 (2.96 to 3.27)	<0.001†
Believability	3.49 (3.33 to 3.64)	3.20 (3.05 to 3.34)	3.36 (3.20 to 3.52)	0.025*

\*Rating for "financial statement" significantly lower than that for "none declared."

†Rating for "financial statement" significantly lower than that for "none declared" and for "grants statement."

lists) on this effect. To adjust for the possible confounding factors of age and sex of the reader we also included these in the statistical model. We included interaction terms to explore the inter-relations between the various factors.

We excluded 18 readers (unable to participate (8), incorrect address (9), lost (1)). Altogether 522/882 (59%) questionnaires were returned (230/440 (52%) herpes paper, 292/442 (66%) problem lists paper). Respondents were significantly older than non-respondents (mean age 45.1 (SD 16.0) years *v* 40.3 (SD 14.0) years,  $t(865) = 4.83$ ;  $P < 0.0001$ ). Overall, importance, relevance, validity, and believability ratings were significantly lower in the "financial statement" group than in the "none declared" group (table). Validity ratings for the "financial statement" group were also significantly lower than for the "grants statement" group. We found significant differences in the ratings between papers for all five measures ( $P < 0.001$ ), with the problem lists paper scoring significantly higher (table A on [bmj.com](http://bmj.com)). We found a significant inter-relation between competing interest and paper for the two measures interest and believability ( $P = 0.012$  and  $P = 0.007$ , respectively). For these measures the lower ratings for the "financial statement" group were more pronounced for the herpes paper. Ratings for all five measures increased significantly with age, and women reported significantly higher ratings than men.

## Comment

Both the type of competing interest and the contents of a study influence readers' perceptions of the credibility of published research. Qualitative research might tell us how. Our study has several weaknesses.

The response rate was low. Readers were from one journal and told they were taking part in a study, which may have influenced responses. Respondents were significantly older than non-respondents, but age was not found to be significantly related to differences between the competing interest groups (there were no significant age-competing interest interactions). Journal editors should pursue the policy of declaring authors' competing interests so readers can make informed judgments about the credibility of research.

We thank the authors of the original manuscripts for allowing us to use them and the readers for taking part in our study.

Contributors: SS, JM, SC, and RS designed the study. SC conducted the study with help from SS and HB. JM and SS performed the data analysis. All authors interpreted the results and wrote the manuscript. SS is guarantor.

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