

The art of the abstract

The abstract is your calling card to the world of scientific research. **Senthil K Selvanathan** and coauthors explain what you need to do to get your message across in a non-abstract way

When we begin researching or reviewing the literature we start with the abstract, but it is easiest to write one when you have finished the rest of your report. It's often the entrance exam for conference papers and presentations. With only the abstract to go on, panels of reviewers sit in judgment, selecting the research to be presented at a conference or simply consigning it to the bin. All they have to go on are a few meagre lines, which may convey years of research. The tools of the keenest crossword expert, a good deal of skill, and hopefully the guidance presented here are needed to make every word count. This is the art of the abstract.

The abstract should be structured, informative, concise, and “klear” (SICK), and if you read no further than this you will already have picked up the starting point of a good abstract. But to produce a real work

of science and art, read on and all will be revealed.

An abstract isn't abstract

When you first look at a scientific article, the title and abstract give you an overall impression of what the article is about. The abstract usually gives the aims of the research, the methods used to investigate the aims, and the main findings and conclusions.

From the abstract, the reader can determine the broad content, results, and conclusions without needing to read the whole paper. The abstract should stand alone and be independent of the rest of the paper. Good abstracts allow researchers to find and assess quickly a wide range of relevant work. In effect, it is a tool that helps the wider scientific community to work together on common problems.

Abstracts are also used to assess pieces of research for acceptance at

conferences—an important part of medicine and science. These meetings allow researchers from around the world to get together, assess, and disseminate other people's work. Once an abstract is accepted it will be presented in one of two ways: as a poster or as an oral presentation. Either way, to reach this stage your abstract must be of a high quality for the conference committee to accept it.

If you are writing an abstract as part of your research report for university then the quality of your abstract will undoubtedly be assessed by the examiners and will be a reflection of your entire report.

I see it's an abstract

When writing an abstract always read the guidelines for authors for the particular journal to which you are submitting, in particular the requirements for layout, headings, and word count. If you don't, your abstract could be rejected without any evaluation or assessment.

Generally, good abstracts are between 200 and 300 words. They are clearly structured and provide concise information that is easily understood. If somebody can understand your abstract then they are more likely to want to read the rest of your article. The structure generally comprises sections, which together aim to answer the following questions:

- What problem have you investigated?
- Why is it important?
- How did you study it?
- What were the results?
- What conclusions have you drawn?
- What are the implications of these conclusions?

If after reading your abstract you have successfully answered all the above questions, your abstract will be on the road to success. Box 1 shows the general sort of individual sections in an abstract.

It's an abstract and art, but is it good?

A good structure will help the content flow more freely. If the steps are logical someone reading your abstract will be able to follow your study from start to finish. Figure 1 shows a flow diagram that should help you to think through your work and start to construct the abstract.

Analysis of an abstract

Box 2 gives an example of an abstract from the *BMJ*. The reader can immediately see the abstract has a structure. The main title, “Self reported stress and risk of breast cancer: prospective cohort study,” is informative, giving the type of



Box 1: An abstract in under 300 words

Title—This should highlight the researched area, with a view to showing the relevance and importance of the paper

Authors—Acknowledge all those who have made important contributions and give details of the place where the research was conducted

Introduction—It is important to use powerful language here to engage the reader in the area of research you have conducted. Write an introductory sentence that states what problem you have investigated, the reason you investigated it, and why it is important. Indicate what gap in medical research you are filling, and describe the impact of a successful result. Be concise.

Aims—Include in this part the specific hypotheses that were investigated and what problems you were trying to solve

Methods—Give a brief explanation of how you investigated the aims. Include the techniques used but avoid abbreviations as these can cause confusion. The statistical tests used must be mentioned. If patients were included, note the selection process, the numbers, whether informed consent was obtained, and whether approval of the ethical committee was obtained

Results—Patient data should be stated first. This includes numbers, sex, age, and length of follow-up. Summarise the key results—that is, those that were significant and led directly to the conclusions drawn. Mean values, standard deviations, and results of statistical analyses should be noted

Discussion—Include here your interpretation of the results. State how your findings compare with published data and discuss the importance of these results and whether the findings add to or contradict the existing evidence

Conclusion—State the importance of these findings and their larger implications with respect to the initial problem and discuss how the research could be developed

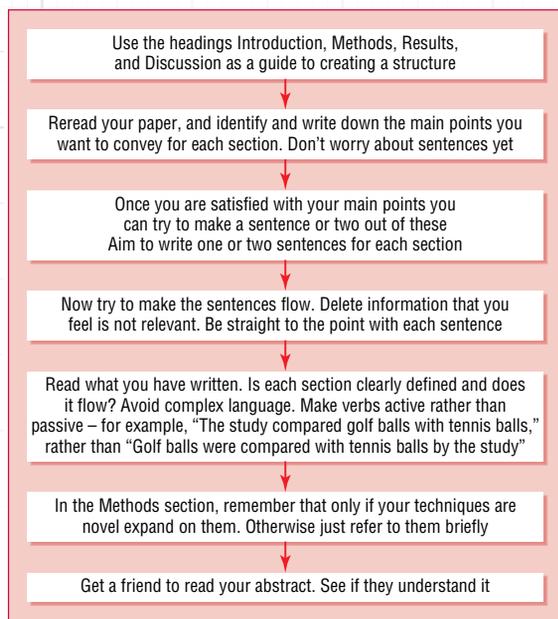


Fig 1 A not so abstract flow diagram

study and the two main variables tested. The introduction gives an adequate background and puts the subject into context. The abstract then clearly defines the aims in one sentence—that is, to see if there is a relation between stress and breast cancer.

The methods give a good idea of the size of the study and the time frame used. The results provide statistical analysis with confidence intervals. They do not make any comments on the importance of the results and what can be deduced. They allow the reader to judge for themselves.

The discussion describes what the authors think about their results. They relate their work to known scientific reasoning—that is, chronic stress impairs oestrogen synthesis. Thus they provide a reason for the relation they have found.

The conclusion asks the readers to take a step back. The authors try to convey that, although stress seems to be a protective factor in this study, we must think about the wider picture and consider that long term chronic stress may have an overall detrimental effect on health.

This abstract clearly shows the importance of SICK. It is structured, informative, concise and klear. Remember,

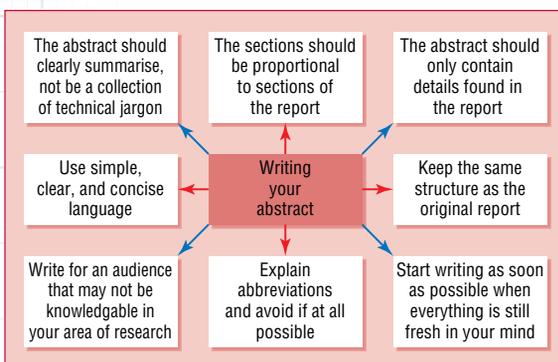


Fig 2 Tips on writing an abstract

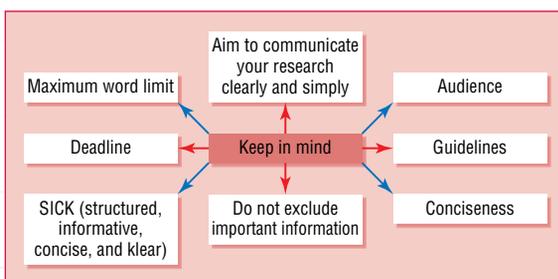


Fig 3 The mind of the abstractionist

Box 2: An Example abstract

Objective—To assess the relation between self reported intensity and frequency of stress and first time incidence of primary breast cancer.

Design—Prospective cohort study with 18 years of follow-up.

Setting—Copenhagen City heart study, Denmark.

Participants—The 6689 women participating in the Copenhagen City heart study were asked about their perceived level of stress at baseline in 1981-3. These women were followed until 1999 in the Danish nationwide cancer registry, with < 0.1% loss to follow-up.

Main outcome measure—First time incidence of primary breast cancer.

Results—During follow-up 251 women were diagnosed with breast cancer. After adjustment for confounders, women with high levels of stress had a hazard ratio of 0.60 (95% confidence interval 0.37 to 0.97) for breast cancer compared with women with low levels of stress. Furthermore, for each increase in stress level on a six point stress scale an 8% lower risk of primary breast cancer was found (hazard ratio 0.92, 0.85 to 0.99). This association seemed to be stable over time and was particularly pronounced in women receiving hormone therapy.

Conclusion—High endogenous concentrations of oestrogen are a known risk factor for breast cancer, and impairment of oestrogen synthesis induced by chronic stress may explain a lower incidence of breast cancer in women with high stress. Impairment of normal body function should not, however, be considered a healthy response, and the cumulative health consequences of stress may be disadvantageous.

(Nielsen NR, Zhang Z-F, Kristensen TS, Netterstrøm B, Schnohr P, Grønbæk M. Self reported stress and risk of breast cancer: prospective cohort study. *BMJ* 2005;331:548-50.)

the balance between being informative and being concise is fine. This is where the true skill of abstract writing lies and one which is worth taking time to develop.

Impressionism in abstract form

First impressions count. Your abstract will provide that first impression of your work for your readers. Writing it takes time and effort. Once you have written it, go over it again and again. Assess it and read it out aloud. Are the sentences concise? Is the work clear? Get a second opinion and even a third. Check that they understand the sense of the writing. Figs 2 and 3 show a number of practical tips on writing an abstract and can be used as checklists. Box 3 gives a list of useful websites and some further reading.

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We thank Janet Warwick and Manisha Mistry for reviewing the final version of the manuscript.

Box 3: Useful and not so abstract websites and further reading

- Koopman P. How to write an abstract. 1997. [www.ece.cmu.edu/\[sim\]koopman/essays/abstract.html](http://www.ece.cmu.edu/[sim]koopman/essays/abstract.html)
- Literacy Education Online. Writing abstracts. 1998. <http://leo.stcloudstate.edu/bizwrite/abstracts.html>
- Alaska Statewide High School Science Symposium. How to write an abstract. www.ashsss.uaf.edu/stu_abstract_writing.php
- Clark C. Writing an abstract. 2001. [www.csupomona.edu/\[sim\]jcclark/classes/bio190/abstract.html](http://www.csupomona.edu/[sim]jcclark/classes/bio190/abstract.html)
- Small KA. How to write an abstract. *American Economic Association Committee on the Status of Women in the Economics Profession Newsletter* 1997 Feb: 22. www.galaxygoo.org/resources/abstract_writing.html
- Hall GM. *How to write a paper*. London: BMJ Books, 2004