



*Citation for published version:*

Family, H, Weiss, M & Sutton, J 2012, Thinking aloud: use of a research technique with pharmacy students and qualified pharmacists. in *International Journal of Pharmacy Practice*. vol. 20(S1), pp. 31.  
<https://doi.org/10.1111/j.2042-7174.2012.00197.x>

*DOI:*

[10.1111/j.2042-7174.2012.00197.x](https://doi.org/10.1111/j.2042-7174.2012.00197.x)

*Publication date:*

2012

*Document Version*

Early version, also known as pre-print

[Link to publication](#)

## University of Bath

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## Thinking aloud: use of a research technique with pharmacy students and qualified pharmacists

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### Background

Protocol analysis (thinking aloud)<sup>[1]</sup> and other cognitive testing procedures are now an essential step in questionnaire development.<sup>[2]</sup> Previously, these procedures have been applied to new questionnaires and not those with reliability and validity data. The context in which any questionnaire is completed can affect how participants respond.<sup>[2]</sup> It cannot be assumed that a questionnaire's reliability and validity will be maintained each time it is used with a new group of participants e.g. pharmacists.<sup>[2]</sup> Pre-existing questionnaires may not have been assessed using cognitive testing procedures as these techniques are a recent innovation in questionnaire design. Aspects of questionnaire reliability and validity (e.g. comprehension) cannot be accurately assessed by traditional pre-test procedures. This issue should be considered by researchers before using a questionnaire. The aim of this study was to use the think aloud technique to assess the reliability and validity of two questionnaires used as part of a study into pharmacists' workload.

### Methods

Ethical approval was granted by the University of Bath, Research Ethics Approval Committee for Health. Nineteen participants (pharmacy students and qualified pharmacists) completed two pre-existing questionnaires. The first questionnaire measured personality and the second measured stress states. Both personality and stress have been shown to affect perceived workload. Participants were asked to say out loud everything they thought whilst answering the questionnaires and recorded their 'think alouds'. These were transcribed verbatim and subjected to four coding schemes to identify comprehension, retrieval, judgement and response issues.<sup>[2]</sup> According to standard procedures any item that 15% of the sample experienced such issues with, would require review before the questionnaire is used further.<sup>[3]</sup>

### Results

No issues were experienced by respondents when answering the personality questions. Four of the stress state questions were found to cause comprehension issues. One question, which asked respondents to rate how "unenterprising" they were feeling caused comprehension problems for 53% of the participants. For example 19 said: *"Unenterprising mm again perhaps slightly more difficult to answer umm probably leaving this one blank really because I'm perhaps not a hundred percent sure how to answer it."* Unexpectedly high scores on the self-focussed attention subscale of the stress state questionnaire were found. The 'think alouds' revealed this was due to reactivity effects<sup>[4]</sup> caused by previous items from the personality questionnaire, for example participant 5 said: *"I thought about my level of ability... yeah it did make me compare myself to others quite a few of the questions did thinking if I was more able than them or not so often."*

### Discussion

This study highlights that researchers should not assume that pre-existing questionnaires are valid and reliable when used in a new context. Researchers and respondents need a shared understanding of the meanings inherent in questionnaire items. If this is not achieved then researchers cannot be sure that their results are valid. Failure to subject pre-existing questionnaires to cognitive testing procedures could lead to unanticipated measurement errors. This study also underlines the importance of checking for reactivity effects when questionnaires are used in conjunction with each other.

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