Executive Summary

Purpose

This study aims to identify and assess the impact of conducting preclinical systematic reviews (SRs) on researchers and research. It focuses on participants who received funding, participated in a workshop and had coaching within the "knowledge infrastructure" module, which was part of a ZonMw More Knowledge with Fewer Animals (MKMD) grant. The project is presented as a case-study in three parts: 1) Inventory of published SRs and grant proposals, 2) Questionnaires, and 3) Semi-structured interviews.

Methods

For our theoretical framework, we considered how the MKMD module might encourage a change in participants' behaviour and what types of impacts might result from the intervention. We used two frameworks, the "Behaviour Change Wheel" and the "Research Impact Framework", to guide our qualitative study. In the first phase we performed analyses of the discussion and conclusion sections of published preclinical SR papers to assess their content and recommendations. We also examined the citation rates of these SRs, the journals they were published in and these journals' impact factors. In the second phase, we designed and sent an online questionnaire to all participants in our target population. The questionnaire contained a combination of closed, open-ended, simple and Likertscaled questions. Participants answered different sets of questions depending on whether or not they had completed their SR at that stage. From the group that had completed their SR, 10 participants accepted our invitation to participate in a semi-structured interview and 8 interviews were conducted. The interview guide focused on participants' experiences with their SRs, the potential impacts of the intervention on their research, their views on research, and their field. Analyses were performed in Excel for the inventory and questionnaire and ATLAS.ti was used to support thematic analysis of the interviews.

Results

The impacts varied according to the three distinct parts of the project and as suggested by our framework. First, the inventory of published SRs revealed an apparent willingness to promote higher-quality studies, to offer information on relevant issues and provide advice for future research. Additionally, it suggests that SRs are appreciated, since they are published in highly ranked journals (for their category) and receive high citation rates (at least 2 to 35). The inventory also highlighted the relevance of the workshop, which received both positive comments and a positive overall grade.

The questionnaire provided more information about participants' experiences and how conducting preclinical SRs impacted their subsequent research. The main impact was on the way participants planned, conducted and reported their subsequent animal studies. In terms of planning and conducting studies, impacts included, for example, their use of a planning guideline, their choice of animal model, topic and intervention, and the methods used to blind, randomize, perform power calculations and avoid unnecessary duplication. In terms of reporting, impacts included recording animal characteristics, housing, blinding and randomizing methods, providing an ethical statement and justifying the choice of animal model. Similar results were observed with regards to appraising studies. Participants reported gaining and improving research and interpersonal skills. They showed interest in performing further SRs in the future and in receiving more coaching, and were likely to recommend conducting SRs to colleagues and peers. Lastly, factors encouraging participants to conduct more SRs were linked to means (e.g. funding, acceptance of SRs in their field, coaching) and

the desire to increase the impact and value of their own research and field (e.g. planning future experiments, addressing topics of interest, avoiding the duplication of unnecessary research). Reasons for performing SRs were linked to increasing the value of their own research or field, or to curiosity/interest.

The interviews highlighted that participants changed their views and gained insights into preclinical research by conducting their own SRs, which in turn made them implement changes in their teams, their field, and potentially in the wider scientific community. Overall, participants described having been confronted with poor quality animal studies which gave them pause for thought and led them to review the quality of preclinical research as a whole, as well as its ethical consequences. Thanks to their new awareness and skillset, their SRs influenced their future work by changing the way they planned, conducted and reported research. Additionally, the SRs provided insights, revealed data gaps, and inspired ideas for research without using animals, e.g. other meta-research projects, research using alternative (animal-free) models and clinical studies. Furthermore, participants were eager to share their new knowledge within their laboratories and to advocate for change within their teams and fields, for example by improving reporting and study design, and by promoting (via opinion papers) the use of preclinical SRs and the design of better preclinical studies in their own fields. However, the interviews revealed that while many participants accepted the value of SRs and observed an increase in preclinical SRs in their fields, many also highlighted a resistance to their use among colleagues, supervisors, peer-reviewers and journal editors. This resistance seems to be linked more to the culture and conventions of preclinical science than to issues within individual laboratories. Consequently, there is a need for education about SRs and their potential in order to increase their adoption and improve current standards. Finally, participants had a positive overall experience with their SRs, although a large number did not realise how much effort such a project required. As a result, they appreciated being coached and supported to conduct SRs appropriately and provided highly positive feedback, as well as suggestions on the module and the ZonMw grant scheme.

Recommendations

The scope of the grant and its current funding structure could become broader and more responsive. First, the reach of the grant could be broadened to apply to a more diverse audience (e.g. graduate students, PhD students) and to include a greater diversity of eligible reviews and studies (e.g. umbrella reviews, studies for SR methods development). The grant could be advertised to this broader audience by offering workshops in the form of PhD credits, or during conferences for a small fee. Alternatively, the grant could be promoted via webinars, websites (of interested institutes, or of ZonMw collaborators), or social media. Second, coaching could be proposed for some stages of the SR only, to fit with participants' needs. This would allow the coaching to take place on a "consultancy" basis, which would require less time and allow more hours to be allocated to researchers needing standard coaching. Furthermore, coaching could be optional for well-trained researchers, or necessary only for some stages. This modification could be accompanied by a lower or alternative funding option than the three already available, corresponding to the amount of effort involved. Third, an adaptable grant could be developed for larger SRs (e.g. SRs aiming to include 10,000 or more papers at title-abstract inclusion), which would better correspond to the duration of these larger studies. Lastly, we would advise continuation of the module in the forthcoming years, with a potential increase in capacity.

Conclusion

This study has highlighted the impacts of conducting preclinical SRs on researchers and (their) research. It clearly shows the value of this intervention, including increased support for the 3Rs, improved transparency, awareness of the need for better study quality, greater critical appraisal of the use of animals, and improved knowledge transfer. All the results contribute to the conclusion that

the module benefited participants and should be continued, albeit with the refinements discussed above.