Researcher Views on the Perceived Influence of Funding Sources in Nanotechnology Research

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Abstract:

Scholars have increasingly focused on the influence of funding sources on research directions and potential conflicts of interest (COI) that arise in scientific research today. Conflicts of interest occur when an individual has a stake in the outcome of a behavior along with the means to influence the particular outcome. COI may be directly influenced by funding arrangements. Understanding researcher perceptions and identifying opportunities for managing COI that may arise are essential to this inquiry. Building on a study of nanotechnology industry and academic researcher views of funding sources and COI, the present study explores the extent to which graduate students, as the next generation of researchers helping shape the direction of the field, (1) believe funding arrangements influence research directions, and (2) recognize and evaluate COI that arise in their work. The study included the implementation of a web survey of users of the fourteen National Nanotechnology Infrastructure Network (NNIN) sites who have recently received their terminal degree.

Introduction:

Funding for nanotechnology research and development has increased both in the U.S.A. and internationally in recent years. Cumulative investment by the U.S. government from 2001 to 2012, as part of the National Nanotechnology Initiative (NNI), totaled $16.5 billion, including $2.1 billion for fiscal year 2012 (NNI, 2011). The NNI (2010) estimated that large corporations and industry support approximately half of the research and development in nanotechnology. The prominence of industry funding and academic-industry collaborations speak to the role of funding sources and their relationship to issues of research direction, research conduct, questions researchers ask, and the extent to which results are shared with other scholars and the larger public. It also speaks to potential conflicts of interest (COI), which are said to occur "when an individual or entity has a stake in a decision and also the means to influence it." (McComas, forthcoming, p. 2.)

Financial COI are generally the most visible type researchers may encounter in their work. The COI can be relatively straightforward, such as when a researcher reviews his/her own article or grant proposal, or less well-defined, as when a researcher exaggerates the significance of results to attract additional funding, or downplays potential risks to protect a funding source (McComas, forthcoming). Merely having a potential COI is not necessarily synonymous with improper behavior; rather, the conditions may favor the development of COI.

There has been increased attention to managing COI via the peer review process and the disclosure of financial interests, on understanding researcher perceptions of such conflicts, on understanding the influence of funding sources on research and professional norms of conduct, and on identifying opportunities for discussion among and training of researchers (McComas, forthcoming). These ethical issues are not unique to nanotechnology. However, the emergence of nanotechnology research warrants additional consideration of the views of its researchers and the implications for addressing the ethical issues raised by the content of the survey.

Survey Implementation:

A web survey was sent to NNIN users on July 6, 2011, by Cornell University's Survey Research Institute. The survey took respondents, on average, eleven minutes to complete. Reminder emails were sent on July 10, 14, and 17. Overall, 656 complete responses were recorded out of a total of 2963 email addresses, yielding a response rate of 22.14%.

Results and Conclusions:

We began by first examining the profile of survey respondents. A majority (54.2%) completed their program of study (Table 1). A large majority (85.4%) depended on external funding for their research (Table 2), and 60.4% had not received advice on how to manage financial COI (Table 3).

Second, the belief that people important to them would want them to pay attention to the influence of funding (i.e., injunctive norms) and the perceived responsibility to do so emerged, after running a hierarchical regression, as significant predictors of researchers' behavioral intentions to recognize COI and take action. The prominence of injunctive norms reveals that perceptions of actions of which other researchers may approve or disprove can have a significant effect on researcher behavior. Other variables did not achieve the same level of statistical significance.

In terms of perceived responsibility, there was variability among respondents in assigning responsibility for considering the influence of funding on research directions to themselves or their supervisors. Respondents were more likely to consider their supervisor as more responsible than themselves for considering the influence of funding sources and for identifying COI.

We also measured the acceptability of several scenarios researchers could encounter related to funding influences. Statistically significant differences in acceptability emerged when respondents answered what they would do, versus what they thought other researchers would do. In essence, they personally would be much more cautious in approaching issues of funding arrangements and COI compared to other researchers.

The data are subject to limitations. Despite being randomly drawn from the larger pool of NNIN users, a low survey response rate means that respondents may not necessarily represent all users. There may also be differences in respondent beliefs depending on the type of nanotechnology research conducted.

Table 1. Educational Background of Survey Respondents

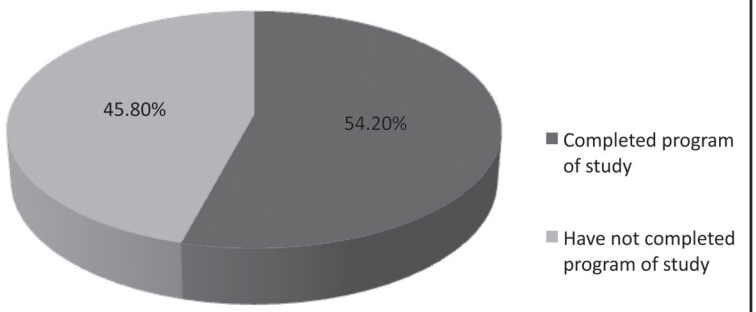


Table 2. Dependence on External Funding Sources

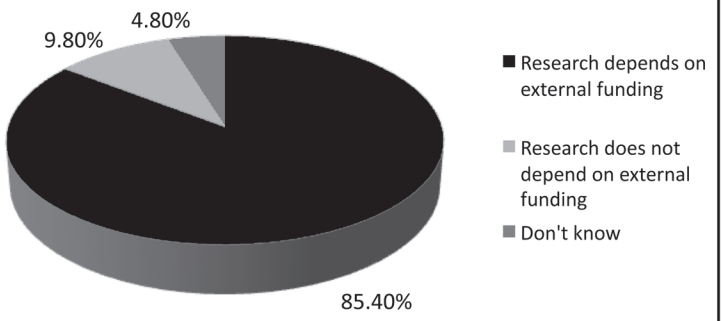
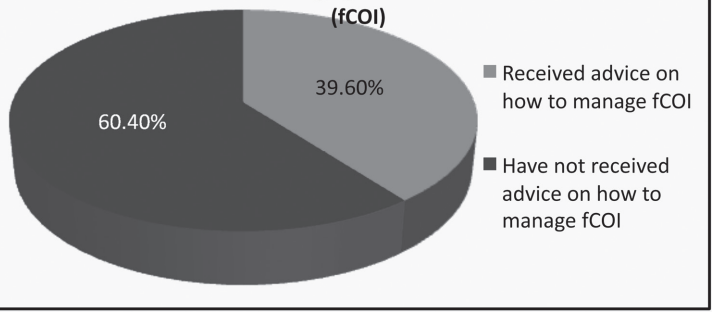


Table 3. Advice on Managing Financial Conflicts of Interest (fCOI)



Future Work:

The present study provides insight into researcher views on the perceived influence of funding sources and COI in nanotechnology research. Future implications include further exploration of the views measured in the survey, while also providing opportunities for further training for early career professionals on understanding and managing COI and similar considerations.

Acknowledgments:

I would like to acknowledge the National Nanotechnology Infrastructure Network Research Experience for Undergraduates (NNIN REU) Program and the National Science Foundation for their support. I also extend a special thanks to Katherine McComas for her guidance and insight, and to Chris Clarke for mentoring me throughout this project. I would also like to thank Rob Ilic and Melanie-Claire Mallison for their support this summer, along with the CNF Staff and the other CNF REUs.

References:

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[2] National Nanotechnology Initiative. (2010). Funding opportunities. National nanotechnology coordination office. http://www.nano.gov/html/funding/home_funding.html. Accessed 14 May, 2010.