TRACKING OUTCOMES OF EARLY CAREER RESEARCHERS IN ASD

Alycia Halladay[1,2] Katie Madgett[1] and Alison Singer[1]
[1]Autism Science Foundation [2]Rutgers University

BACKGROUND

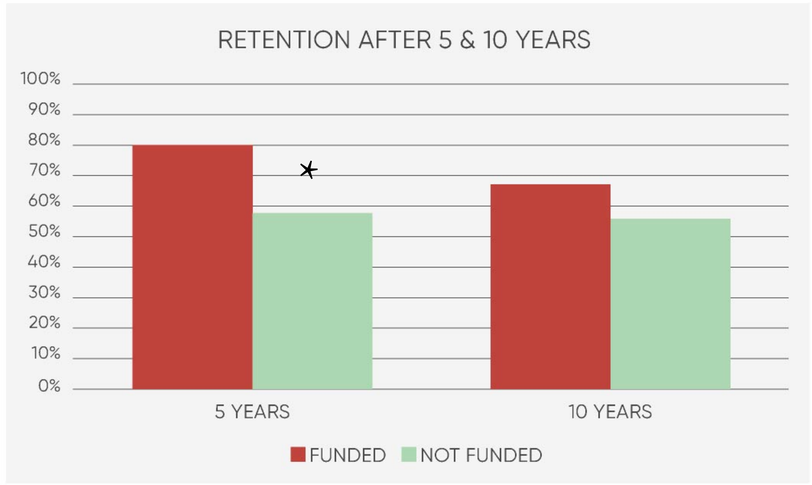
Autism advocacy organizations have funded millions of dollars in pre- and post-doctoral fellowship programs that train emerging talents in autism science. Yet, there is little data on the short and long-term impact of these investments. How do we measure impact in an objective way--one that does not rely on soliciting information through personal contact, which is often infeasible on a large scale? For this project, we evaluated a collection of applications submitted to the Autism Science Foundation's pre and postdoctoral fellowship program from the years 2010-2016 (n=393). Some of these applications were ultimately funded (n=55), while others were not (n=338). Using only publicly available resources and databases—such as Google, LinkedIn, University websites, and NIH iCite– we determined each applicant's status at the end of a specified period along four outcome categories (retention, publications, collaborations, and RCRs). We then attempted to determine if any of these outcomes were significantly affected by the presence or absence of ASF funding. In order to explore potential sources of variation other than funding status, we also looked at these same outcomes by application year, fellowship type (pre or postdoc), and general research area (neurobiology/genetics vs. other area).

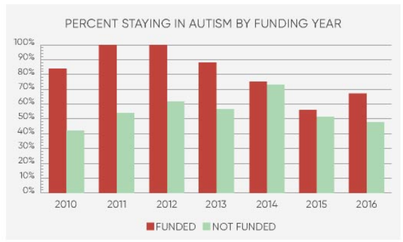
METHODS

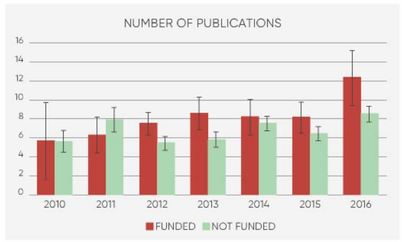
- **Retention – Whether applicants were still in the field five years (and ten years, when possible) after applying to ASF.** Retention was defined as remaining in active research with a focus on autism, or working primarily with autism in a clinical setting. This was determined by using public online resources, most often LinkedIn and university/hospital affiliated pages.
- **Publications – Number of publications (often used as a proxy for productivity).** A publication was defined as any publication listed in PubMed where the applicant was listed as an author (in any order) that was published in the five year period after application.
- **Collaborations – Number of collaborations.** We defined collaborations as unique co-authors across publication years for each applicant, divided by the number of publications in an attempt to control for the wide range of output among applicants. We acknowledge the limitations of this definition, and are interested in hearing the perspectives of others on how to obtain a more meaningful metric.
- **RCR – Mean Relative Citation Ratio of the applicant's publications within the five year period after application.** RCR is "a new metric developed within the Office of Portfolio Analysis (OPA) that represents a citation-based measure of scientific influence of one or more articles. It is calculated as the cites/year of each paper, normalized to the citations per year received by NIH-funded papers in the same field and year". – from ***What is iCite?*** (www.dpcpsi.nih.gov).

We analyzed retention, publications, collaborators, and RCR for all applicants to explore whether any of them were impacted by ASF funding. Other potential sources of variation (other than funding status) that we looked at were:

- **Year of application**
- **Grant type** (pre-doc vs postdoc)
- **Broad research area of the applicant** (neurobiology/genetic vs other) Neurobiology/genetics was defined as the use of animal and cellular models, tissues/samples collected for DNA and RNA, as well as bioinformatics on brain circuitry, genetics, and molecular and neurobiology. Those not falling into this category were labeled 'other'. We included this because we noticed a high number of authorship on papers regarding genetic findings, driven by intentional or incidental collaborations, which may or may not be reflective of what we would conceive of as a group. Therefore we decided to do an analysis of these two groups.







MAIN RESULTS

- **Funded applicants are significantly more likely to remain in ASD after five years[1] but this difference was not observed at ten years2. The only applicants that could be tracked to 10 years were those who were funded in 2010 or 2011.**
- **No significant difference was found in publications, collaborations, or RCRs for funded and unfunded applicants.**
- **Collaborations and RCRs did vary significantly by broad research area, with those in the neurobiology/genetics category having more collaborations[3] and higher RCRs[4] on average.**

[1]X^2 (1, N = 393) = 10.36, p <.01 **[2]2010-2011 10yr:** X^2 (1, N = 39) = .42, p = .51 [3]p < .001 [4]p = .001

ACKNOWLEDGEMENTS

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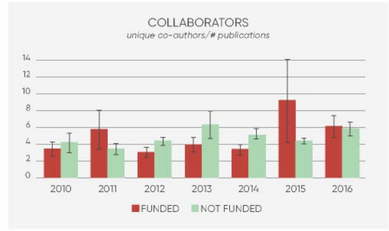
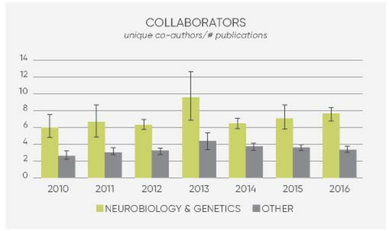
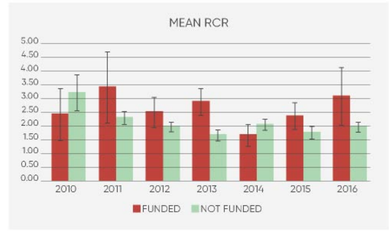
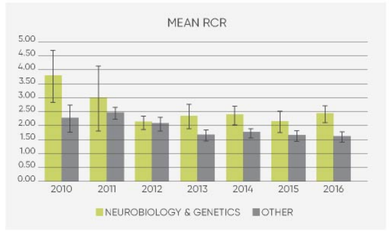
ADDITIONAL FINDINGS









No difference between funded and not funded applicants

There was a significant increase in both collaborators and RCRs in those whose research focused on neurobiology and genetics, p<0.001.

QUESTIONS FOR DISCUSSION:

- **Autism specific funding is associated with higher retention in autism research, but this does not necessarily lead to an increase in publications/productivity. Although this is a popular measure within academia, are raw publication numbers a reasonable assessment of productivity in the context of an autism organization?**
- **Is RCR a good measure of impact? RCR has been used as a replacement for the h-index in evaluating career progress and publication quality, but there remain arguments for and against both.**
- **The measure we used to calculate collaborations may lack construct validity. However, an objective measure of collaborations is needed for the field. What is the definition of a meaningful collaboration, and can it be calculated? Are these measures the best way to really assess impact?**
- **How do we identify and take into account variations between research areas when assessing measures of impact, particularly around publication authorship and collaboration?**
- **We did not track grants awarded to applicants by other organizations, but this may be an additional measure of impact. In order to track grants across all organizations, a central database would be ideal. Recently, IACC has debuted the Autism Research Database[5] to give access to grant information across several autism focused organizations. This database is a promising tool that might be helpful for future analyses.**

[5]https://iacc.hhs.gov/funding/data/