Analysis of NIH's Research on Research Integrity Program

Executive Summary: The Office of Research Integrity (ORI) in the Office of Public Health & Science and the Office of Extramural Programs (OEP) at the National Institutes of Health (NIH) have had a long-standing commitment to the responsible conduct of biomedical research and specifically created the Research on Research Integrity (RRI) program in FY 2001 to support research on this topic. Evaluation of the topics received, the peer review process, the characteristics of the applicants and the impact of the grants awarded demonstrates this program to have had a measurable impact on several topics within the field of research integrity. Funding for the RRI program has used a set-aside program and therefore a defined number of awards were made regardless of the number of applications received. This limits the ability to draw direct comparisons to the success rate of other human subjects and bioethics research topics. However, for the purposes of this evaluation, two comparison groups were included, the Human Subjects Research Bioethics program and broader research programs that involve human subjects. This evaluation found that the program is attracting a mix of topics.

Finding 1: Research on Research Integrity award rates were approximately 19% from FY 2001 – 2009. Human Subject Research projects broadly at the NIH during a similar time period were awarded at 27%, and initial applications received under the Human Subjects Research Ethics (or Bioethics) FOAs were awarded at 9.6%.

Finding 2: Within the RRI program, R01 applications were the predominant application type received (77% of total) and these applications had an overall award rate of 21%. The remaining applications were R21s, which were awarded at a rate of 17%.

Finding 3: Applicants tend to have prior NIH support; however, those with no prior NIH support are more likely to be funded, resulting in an approximately equal proportion of awardees with and without prior NIH support.

Finding 4: Male applicants and awardees slightly outnumber female applicants and awardees.

Finding 5: The majority of RRI applicants and awardees hold PhD degrees, followed by MD/PhDs and MDs. Additionally, applicants held MPH, MSN or RN or JD degrees with their terminal degrees. Some applicants held a single degree as well suggesting that the RRI initiative is attracting a diverse group of researchers.

Finding 6: The most frequent topics of applications and awards in the RRI program are:

- Factors that enhance or undermine integrity

- Fostering a commitment to responsible conduct in research; Influence of the research environment; Institutional climate and responsibility

- Human Subjects Research

- Education on the responsible conduct of research (RCR) and Mentor/trainee responsibilities

In recent years, many applications have been received for the topic "Research collaborations and issues that may arise from such collaborations; Integrity and research relationships", however proportionally fewer awards have been made on this topic than expected based on the number of applications received.

Finding 7: Analysis of the topics of research publications of investigators supported by the RRI program finds research topics consistent with research integrity themes, such as "Scientific Misconduct", "Ethics, Research" and "Ethics, Professional".

Finding 8: Peer review of the RRI applications has been conducted primarily in ICs by SEPS, one handled by the National Institutes of Neurological Disorders and Stroke (NINDS), one by the Center for Scientific Review (CSR) and most recently by the National Center for Research Resources (NCRR). Review panelists appear to have published in research areas outside of typical RRI subject areas.

Finding 9: Priority scores of applications to the RRI program were found to be generally lower, (lower scores are evaluated more favorably), than those received as part of the Human Subjects Research Ethics program.

Finding 10: Close to half of the projects have produced research publications, and all of those started between FY 2001 and 2007. Of these projects five projects have four or more publications. Additional time is required before projects awarded in recent FOAs can produce publications.

Introduction:

In the Department of Health and Human Services, the Office of Research Integrity (ORI) in the Office of Public Health & Science and the National Institutes of Health (NIH) have had a long-standing commitment to the responsible conduct of research funded by the Public Health Service. ORI in partnership with the NIH's Office of Extramural Research (OER) Office of Extramural Programs (OEP) is responsible for ensuring the compliance of NIH grantees with Federal regulations and to that end, ORI/OEP has led an effort for more than 10 years to stimulate extramural Research on Research Integrity (RRI) through a series of targeted FOAs (**Table 1**) funded through set-aside budget allocations.   A series of 11 Funding Opportunity Announcements (FOAs) specifically designed to attract research projects studying Research on Research Integrity was made available to the NIH extramural community between 2001 and 2010. Table 1 below lists the applications received under RRI FOAs and the awards made from these application pools.

Table 1: Applications to and Awards made under NIH's Research on Research Integrity Funding Opportunities

Funding Opportunity	Fiscal Year	Title	Number of Applications	Number of Awards
RFA NS01-008	2001	RESEARCH ON RESEARCH INTEGRITY (R01)	21	9
RFA NS02-005	2002	RESEARCH ON RESEARCH INTEGRITY (R01)	24	9
RFA NS03-001	2003	RESEARCH ON RESEARCH INTEGRITY (R01)	25	4
RFA NS04-001	2004	RESEARCH ON RESEARCH INTEGRITY (R01)	46	6
RFA NS05-003	2005	RESEARCH ON RESEARCH INTEGRITY (R01)	47	6
RFA NR06-001	2006	RESEARCH ON RESEARCH INTEGRITY (R01)	39	6
RFA NR07-001	2007	RESEARCH ON RESEARCH INTEGRITY (R01)	22	6
RFA RR07-003	2007	RESEARCH ON RESEARCH INTEGRITY (R21)	22	3
RFA RR07-004	2007	RESEARCH ON RESEARCH INTEGRITY (R03)	1	0
RFA RR09-004	2009	RESEARCH ON INTEGRITY IN COLLABORATIVE RESEARCH (R21)	19	4
RFA RR10-001	2010	RESEARCH ON INTEGRITY IN COLLABORATIVE RESEARCH (R21)	24	2
Total			**290**	**55**

In 2010, ORI and OEP conducted an evaluation of the project applications received under these FOAs in order to better understand the success of ORI's efforts to promote research on the responsible conduct of research and to diversify the community doing research in this area. This report documents that analysis. The first section describes the data sources and methodologies used for the evaluation. Following that section are the findings for the analysis of these FOAs, a comparison to a set of FOAs in Human Subject Research Ethics, a project summary and future directions.

Data Source and Methodology:

Analysis of Application and Award Activity

The primary data source for information about the Research on Research Integrity applications and projects was the IMPACII database. To identify the universe of applications received in response to these funding opportunities, the RFA numbers listed above were used as a starting point to collect application records by year associated with each RFA. These applications were then used to find all other applications that had a similar triplet of information that included the Activity Code (e.g. R01), the funding Institute or Center (e.g. HG) and six digit Serial Number issued by the Institute/Center. This method allowed for the identification of additional applications for which records in IMPACII were missing the RFA number value or had incorrect RFA number values.

Most applications received by the NIH for competing applications are not funded on the first attempt, and therefore this analysis combines all applications submitted for a particular grant into one "project". In the case of the RRI data set, no amended applications were permitted, and this applied to any comparison group, except wherever explicitly stated differently. Values for fields, such as the Sponsoring Organization were selected from the last application received (funded or unfunded).

For the Principal Investigator of each project we used various tables from the IMPACII database to extract race/ethnicity, gender, and degree information. For any multi-PI application, all PIs were included. For some of the PIs for whom no degree information was available, ORI provided degree information. For those PIs for whom no gender information was available, a manual review of websites and information available on the Internet was used to determine gender. For the analysis of New Investigators, if a PI had no prior significant NIH independent research award, s/he was considered a New Investigator[1].

Because the RRI program was funded through a set-aside RFA, applications received under these FOAs were assigned to only one category of review sections, 'special emphasis panel' or 'SEP'. The categories were derived from the Study Section Code in IMPACII; those applications with a study section code beginning with 'Z' or those with the code 'SPEPOD' were coded as 'SEP'.

Analysis of responsiveness to FOA topic areas

For the analysis of topics of applications, we worked with ORI and OEP staff to develop a list of research integrity topic areas based on the topic areas outlined in the Funding Opportunity Announcements officially available through the NIH Guide. Several sources of information were used to identify abstracts for all applications in the study. If an approved abstract existed in the Abstracts_T table in IMPACII, then it was used. If not, the summary statement from the study section records was used, as captured in the Extractions_T table. Finally, ORI provided a small number of abstracts from files available to program staff, but not part of IMPACII. For assigning topics, each abstract and title were read and the project assigned one or multiple topic categories. We found that most projects have multiple topic categories. A summary table of topics for received and funded applications was included in the 'Topic_Analysis' file, along with definitions of the Topics. ORI and OEP staff reviewed and reclassified Topics wherever necessary.

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[1] This definition was based upon the current NIH definition of a New Investigator.
http://grants.nih.gov/grants/new_investigators/#definition (accessed 12/31/2009)

Peer-review of Research Integrity Applicationd

In Task 1, we determined the study section to which the Research Integrity applications were assigned. Using tables in IMPACII providing more information about study section rosters and the reviewers participating on them, we prepared a list of the study sections that reviewed grants for each of the FOAs. Upon inspection by program staff it was determined that some of the individuals in IMPAC II were likely to be review staff and should not be included in the analysis of Reviewer expertise. ORI and OEP staff provided feedback and NIH staff were manually removed from the reviewer lists.

Ninety-six distinct reviewers were identified in total. For each reviewer, last name, first initial and email address/zip code information were used to identify matching publications in National Library of Medicine's MEDLINE database. Using this method, publications were found for less than ¼ of reviewers, likely because incomplete email or zip code information was available for many reviewers. Using the exact name, publications were found for 67 of 96 reviewers. A manual review of some of these publications was conducted to confirm the approach.

We determined each reviewer's scientific expertise by analyzing the Medical Subject Heading (MeSH terms) for those publications identified using the name-based matching algorithms. We excluded MeSH terms that occur very frequently on all MEDLINE publications, as these provided little information about the specific research areas of the reviewers. To do this, we assigned each MeSH Term a weight by calculating the number of publications in which each MeSH Term appears divided by the total number of publications in MEDLINE. Terms found on more than 80% of the papers in MEDLINE were omitted from consideration (i.e. Human, Mice, Rice, Animals, Adult, Middle Aged, Aged, Rats, Time Factors, Child, Preschool, and United States). This represented 64 of 27,232 MeSH Terms.

For each reviewer, we then determined the ten most-frequent MeSH Terms among the publication set identified using the name-based matching algorithm. We then summarized across individuals to determine the top 10 MeSH Terms for each study section. For the final data tables presented in the report, MeSH terms related to laboratory research were removed and those related to ethical, legal, and social aspects of research were included.

We considered using the Thomson Reuters' Web of Science databases for a more exhaustive list of publications in the legal and social science fields, however, the Web of Science does not have a similar topical vocabulary to MEDLINE's MeSH. A review the list of journals provided by OEP staff found that most of these journals were indexed in MEDLINE and the publications not included in the Web of Science were minimal.

Analysis of RRI grant applicants

Two hundred and one principal investigators were identified as applicants to the Research Integrity FOAs in this study, either as Principal Investigator, or Multi-Principal Investigator. We identified relevant publications authored by these scientists using the following methodology: for each applicant, we used last name, first initial and email address to locate matching publications in MEDLINE. If no email address was available for the applicant, we used a combination of applicant last name, first initial and zip code to locate matching publications. If neither email nor zip code were available, we matched investigators to publications that acknowledged funding on which the investigator was a PI in IMPACII. A total of 166 applicants were found for whom there existed one or more matching publications. We manually searched PubMed/MEDLINE for 34 applicants for whom no matching publications were found from the above method. For these individuals, we first checked all publications in MEDLINE with the same last name and first Initials as the specific applicant. We then read some these articles to determine if they were related to 'research integrity'. We also searched

using each PI's full name in MEDLINE. We found that although there were some multiple entries for the same person in the MEDLINE (i.e. for 'Jay Herson', there are two different name 'Herson J' and 'Herson Jay') they all refer to same person. For a few applicants, similar names were identified for which it was difficult to determine whether they referred to the applicant (i.e. for 'Gregory McMillan', in MEDLINE there were 2 names which were very close: 'McMillan G' and 'McMillan Greg', or for 'Stephen Popper', there were 2 names 'Popper S' and 'Popper SJ').   There are a few applicants for whom no publications were found in MEDLINE, even after searching with the combination of last name and first initials. For these authors, we did not find any potential matches with similar names and they are excluded from the expertise analysis. We determined each applicant's scientific expertise using MeSH terms following the same approach as described above for reviewer expertise.

Analysis of Publication Productivity of RRI funded projects

For the analysis of publication productivity by the set of funded Research Integrity projects, we use the matching algorithm developed for National Institute of Allergy and Infectious Disease's electronic Scientific Portfolio Assistant (eSPA) system that uses the grant number string (e.g. R01CA123456) extracted from the MEDLINE database to identify publications acknowledging funding from one of the RRI projects. This process uses fuzzy matching logic to allow for matching to grant number strings that may contain mistakes, typos or only sections of the grant number string. In addition, the eSPA matching algorithm also includes publications matched in NIH's SPIRES system. Thus all publications acknowledging support from NIH projects in the SPIRES database are combined with those identified by the eSPA specific algorithms. When using the eSPA application, this is referred to as SPIRES +.

Grant Success Rates: Comparison to non-Research Integrity Research Grants

Using the review related information from IMPACII collected above, we compared funding rates, the mean, median, maximum and minimum priority scores for applications submitted to the Research Integrity FOAs with those submitted to the Human Subjects Research Ethics FOAs set identified in a previous analysis conducted by OER. Because the RRI FOAs did not permit resubmission of amended applications, the Bioethics Human Subjects Research application data were adjusted to provide success rate calculations for the first application received only. In all, 187 initial applications were received for the following FOAs: OD97-001; PA02-103; PA06-368; PA06-369; PA07-277; PA99-079. In addition, the RRI program is an RFA and therefore a defined number of awards are made based on the funding amount allocated to the program. The number of awards is not influenced by the number of applications received, and applications received to a given RFA are evaluated together with only those other applications received in response to the same RFA. Therefore any comparison to the Bioethics and HSR programs must take into consideration the fact that the RRI program's success rates may be low as the funding amount dictates the number of awards.

Findings:

Impact of the selected FOAs on NIH's support for Research on Research Integrity

Table 2 below presents the total number and percentage of applications and awards for each of the RRI FOAs. As can been seen, NS04-001 (FY 2004), NS05-003 (FY 2005) and NR06-001 (FY 2006) received the largest number of applications to the RRI programs during the analysis period. One plausible explanation could be the visibility of the program was not as high. The number of awards made during the time period study has remained consistent, which is not surprising giving the stability of funding allocations made to the program. The funding rates by FOA were lower during the FY2003-2006 when a substantial increase in applications was not matched by an increase in awards made.

Table 2: Applications, Awards and Award Rate by Funding Opportunity Announcement

Funding Opportunity Announcement	No. of Applications Received	% of Applications Received	No. of Awards Made	% of Awards Made	FOA Award Rate
NS01-008	21	7.2%	7	12.7%	33.3%
NS02-005	24	8.3%	10	18.2%	41.7%
NS03-001	25	8.6%	5	9.1%	20.0%
NS04-001	46	15.9%	5	9.1%	10.9%
NS05-003	47	16.2%	7	12.7%	14.9%
NR06-001	39	13.4%	5	9.1%	12.8%
NR07-001	22	7.6%	7	12.7%	31.8%
RR07-003	22	7.6%	3	5.5%	13.6%
RR07-004	1	0.3%	0	0.0%	0.0%
RR09-004	19	6.6%	4	7.3%	21.1%
RR10-011	24	8.3%	2	3.6%	8.3%
Total	**290**		**55**		**19.0%**

As a control analysis, we report application and award data for all research grants across the NIH that had human subject code values indicating human subject involvement. This comparison group was limited to new (type 1) R01, R03 and R21 applications that were received within the Fiscal Years as the RFAs studied. Table 3 shows the applications and awards by Fiscal Year and the Award Rates for this comparison group as well as the set of new applications received in response to one of the Human Subjects Research Ethics (or HSR Ethics) FOAs. It is important to note that both of these comparison groups are not set-aside programs like the RRI and therefore direct comparisons of success must take into consideration the fact that set-aside programs have a defined funding amount during each review round.

Table 3: Applications and Awards, and Funding Rates by Fiscal Year for Human Subjects Research Ethics (HSR Ethics) and All Human Subjects

FY	Human Subjects Research Ethics			All Human Subjects		
	Appls	**Awards**	**Award Rate**	**Appls**	**Awards**	**Award Rate**
2000	11	2	18.2%	7,293	2,366	32%
2001	10	1	10.0%	7,807	2,573	33%
2002	18	0	0%	8,529	2,789	33%
2003	16	2	12.5%	9,718	2,837	29%
2004	13	1	7.7%	11,447	3,028	26%
2005	29	1	3.4%	11,567	2,791	24%
2006	18	3	16.7%	10,803	2,484	23%
2007	26	1	3.8%	10,017	2,449	24%
2008	24	6	25.0%	9,527	2,280	24%
2009	22	1	4.5%	8,944	1,400	16%
Total	**187**	**18**	**9.6%**	**108,354**	**29,247**	**27%**

Overall, the funding rate for the HSR Ethics set of comparison group projects is 9.6%. Because the funding rate for the RRI projects is 19%, RRI applications received are more likely to be funded. However, during a similar time frame applications involving human subjects received across the NIH were awarded at 27%. When looking at these data by Fiscal Year, we see that trends are similar to human research more broadly at NIH except for the years FY2003-2006 when the RRI program applications experienced lower success rates.

Table 4 below lists the NIH Institutes and Centers that received applications for the RRI program, along with the Agency for Healthcare Research. The three managing programs received the applications NINDS (53%), with NCRR (22%) and NINR (20%) and then transferred applications as appropriate to other ICs for payment, with NIGMS (5%), NCI (4%) and NLM (4%) the 3 ICs funding the highest number of awards among the remaining ICs.   These trends reflect the fact that the RRI programs are managed by specific officers within specific ICs on a rotating basis. When comparing funding rates for the projects submitted to each managing IC we find that all had similar rates - NINDS has the highest funding rate at 17%, NINR follows with 16%, and NCRR has the lowest at 12%.

Recently the NCRR has been managing the program and thus we see for FY2007-FY2011 all applications and awards being received and made by NCRR. There is consistently at least one award made by other ICs outside of that managing the program.

Table 4: Applications and Awards by Sponsoring IC and RFA/PA Number

Spons. IC	NS01-008 App	NS01-008 Awd	NS02-005 App	NS02-005 Awd	NS03-001 App	NS03-001 Awd	NS04-001 App	NS04-001 Awd	NS05-003 App	NS05-003 Awd	NR06-001 App	NR06-001 Awd	NR07-001 App	NR07-001 Awd	RR07-003 App	RR07-003 Awd	RR07-004 App	RR07-004 Awd	RR09-004 App	RR09-004 Awd	RR10-001 App	RR10-001 Awd	Total App	Total Awd
AHRQ											1	1											**1** 0%	**1** 2%
NCI											1	1	1	1									**2** 1%	**2** 4%
NCRR															21	2	1		19	4	24	2	**65** 22%	**8** 15%
NHGRI											1	1											**1** 0%	**1** 2%
NHLBI									1	1													**1** 0%	**1** 2%
NIAAA									1	1													**1** 0%	**1** 2%
NIDA					1	1																	**1** 0%	**1** 2%
NIGMS											1	1	1	1	1	1							**3** 1%	**3** 5%
NINDS	20	6	23	9	23	3	45	4	44	4													**155** 53%	**26** 47%
NINR	1	1	1	1	1	1	1	1	1	1	35	1	18	3									**58** 20%	**9** 16%
NLM													2	2									**2** 1%	**2** 4%
Total	**21** 7%	**7** 13%	**24** 8%	**10** 18%	**25** 9%	**5** 9%	**46** 16%	**5** 9%	**47** 16%	**7** 13%	**39** 13%	**5** 9%	**22** 8%	**7** 13%	**22** 8%	**3** 5%	**1** 0%	**0** 0%	**19** 7%	**4** 7%	**24** 8%	**2** 4%	**290**	**55**

The vast majority of applications received to the RRI funding opportunities have been of the standard R01 mechanism (Table 5). When NCRR assumed leadership of the Research Integrity portfolio it was observed that many of the R01 projects received were funding large survey-based project methodologies which were not meeting the goal of more innovative or experimental approaches to address key issues in Research Integrity. Therefore, recent FOAs have been focused on smaller grant mechanisms such as R03s and R21s. RR07-004 was specifically listed for the R03 mechanism, however only one application was received and it was not funded. Since then the use of this mechanism for RRI has been abandoned.

Table 5: Applications and Awards by Activity Code and RFA Number

AC	NS01-008		NS02-005		NS03-001		NS04-001		NS05-003		NR06-001		NR07-001		RR07-003		RR07-004		RR09-004		RR10-001		Total	
	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd
R01	21	7	24	10	25	5	46	5	47	7	39	5	22	7	0	0	0	0	0	0	0	0	**224**	**46**
																							77%	84%
R03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**	**0**
																							0%	0%
R21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	3	0	0	19	4	24	2	**65**	**9**
																							22%	16%
Total	21	7	24	10	25	5	46	5	47	7	39	5	22	7	22	3	1	0	19	4	24	2	290	55

When comparing project funding rates for the different grant mechanisms, we see that R01 applications for research integrity are funded at a slightly higher rate than R21s, as shown in Table 6 below.

Table 6: Project Funding Rate by Activity Code and RFA Number

AC	NS01-008	NS02-005	NS03-001	NS04-001	NS05-003	NR06-001	NR07-001	RR07-003	RR07-004	RR09-004	Total	HSR Ethics
R01	33%	42%	20%	11%	15%	13%	32%				21%	9.0%
R03									0%		0%	-
R21								14%		21%	17%	12.5%
Total	33%	42%	20%	11%	15%	13%	32%	14%	0%	21%	20%	28%

Interestingly, although the HSR Ethics applications are less likely to be funded than the RRI applications, among the comparison group R21s applications are more likely to be funded than R01s consistent with the HSR Ethics program's goal of bringing investigators new to this research area to projects on ethics.   It may be advisable for the OEP and ORI program staff to reevaluate whether the rationale for the use of the R03 and R21 mechanisms is being communicated to both applicants and reviewers.

Impact of the Research on Research Integrity program on investigators in the field

One of the goals of this program is to diversify the community of investigators conducting Research Integrity research. As one measure of testing whether the RRI program has achieved this goal, we analyzed the prior NIH support of investigators. While 30% of the applicants to the RRI programs have no prior NIH support, 47% of the awardees have no prior support, demonstrating that the program is funding new NIH investigators at a higher rate than those with prior training and research support from the NIH (Table 7). This is supported further by the project funding rates shown in Table 8, with applicants with no Prior NIH support having an award rate of almost twice that of those with previous NIH support.

Table 7: Applications and Awards by NIH Prior Support and RFA Number

Prior NIH Support	NS01-008		NS02-005		NS03-001		NS04-001		NS05-003		NR06-001		NR07-001		RR07-003		RR07-004		RR09-004		RR10-001		Total	
	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd	App	Awd
No Prior NIH Support	3	2	7	4	5	2	15	3	19	4	11	2	11	5	7	1	0	0	8	3	6	0	92 30%	26 47%
Prior NIH Support	18	5	17	6	20	3	31	2	28	3	28	3	11	2	15	2	1	0	11	1	18	2	198 70%	29 53%
Total	21	7	24	10	25	5	46	5	47	7	39	5	22	7	22	3	1	0	19	4	24	2	290	55

Table 8: Project Funding Rates by Prior NIH Support and RFA Number

Prior NIH Support	NS01 -008	NS02 -005	NS03 -001	NS04 -001	NS05 -003	NR06 -001	NR07 -001	RR07 -003	RR07 -004	RR09 -004	Total
No Prior NIH Support	67%	57%	40%	20%	21%	18%	45%	14%	0%	38%	**30%**
Prior NIH Support	28%	35%	15%	6%	11%	11%	18%	13%	0%	9%	**15%**
Total	**33%**	**42%**	**20%**	**11%**	**15%**	**13%**	**32%**	**14%**	**0%**	**21%**	**20%**

OER and ORI program staff have indicated that anecdotal evidence exists that women and other historically underrepresented demographic groups are well represented among investigators conducting research on research integrity. An analysis of the 277 applications received for whom a gender was specified as either male or female shows that while there are fluctuations year to year in the proportion of each gender applying to the program and being awarded, overall the program is close to parity for applications and awards from men and women (see Table 9). The percentage of female RRI awardees (47%) is almost double that of female RPG awardees in FY 2004 (24%) supporting the finding that this field has high representation among women.[2]

Table 9: Application and Awards by FY and Gender

Gender	2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		Total	
	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw
Female	5	3	13	6	13	4	20	1	23	3	20	3	8	1	9	1	3	3	19	1	133	26
	20%	33%	52%	75%	54%	80%	45%	17%	59%	50%	49%	50%	42%	17%	41%	50%	60%	100%	59%	50%	48%	47%
Male	20	6	12	2	11	1	24	5	16	3	21	3	11	5	13	1	2	0	13	1	143	29
	80%	67%	48%	25%	46%	20%	55%	83%	41%	50%	51%	50%	58%	83%	59%	50%	40%	0%	41%	50%	52%	53%
Total	25	9	25	8	24	5	44	6	39	6	41	6	19	6	22	2	5	3	32	2	277	55

Of the 254 RRI applications on which the investigator reported race or ethnicity information, the overwhelming majority come from White applicants (94%), followed by American Indian/Alaskan (2.8%), Asian (1.6%), Black/African American (1.6%) and Hispanic/Latino (0.4%). The distribution of RRI awards made follows the same pattern. Whites appear to be overrepresented among RRI investigators than NIH funded investigators broadly and this overrepresentation appears to come together with underrepresentation of the Asian and American Indian/Alaskan racial groups.[3]

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[2] NIH OER Report, NIH Research Grants By Category, FY 2004 from http://grants2.nih.gov/grants/policy/sex_gender/q_a.htm accessed on February 3rd, 2011.
[3] NIH Report, The Challenge of Achieving Diversity in Biomedicine, Dr. Raynard Kington accessed from http://report.nih.gov/investigators_and_trainees/index.aspx

As shown in Table 10, when analyzing the degree categories of the applicants we see that the majority of applicants (57%) hold a PhD as their primary doctoral level degree, followed by MD holders (10%), and then several PhD holders with other significant degrees: PhD, MDs (9%), PhD, MPH (6%), PhD, MSN/RN (5%) and PhD/JD (3%). MD, MPH holders are also observed at 3% in the applicant pool. Among awards, PhD holders remain unchanged (58%), but we see that PhD, MD holders (13%) and applicants with PhD, JD degrees (7%) fare better than expected and MD holders fare worse (5%). Further evaluation of the degree fields of the RRI applicants and awardees would provide more information about which fields of study are attracted to and receive funding for Research on Research Integrity.

Table 10: Application and Awards by Investigator Degree Category

Degree Category	Applications													Awards	
	Total	%	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010		Total	%
PhD	164	57%	16	14	11	30	25	20	11	13	4	20		32	58%
PhD, JD	9	3%	2	1	1	1	1	2	0	0	1	0		4	7%
PhD, MPH	17	6%	1	1	0	1	2	6	1	1	0	4		3	5%
PHD, MSN/RN	15	5%	0	3	1	3	3	1	2	1	1	0		3	5%
PhD, MD	25	9%	2	2	2	5	4	1	4	2	3	0		7	13%
MD	29	10%	3	2	6	4	1	6	1	3	0	3		3	5%
MD, MPH	8	3%	0	0	1	1	0	3	1	0	0	2		1	2%
EdD or EdD, JD	4	1%	1	0	2	0	0	0	0	0	1	0		1	2%
MD, JD	1	0%	0	0	0	0	0	1	0	0	0	0		0	0%
JD or JD, MPH	4	1%	0	0	0	0	2	0	0	1	0	1		0	0%
MSN/RN	2	1%	0	1	0	0	0	0	0	0	0	1		0	0%
Masters	7	2%	0	1	1	0	2	1	0	0	0	2		1	2%
Other	3	1%	0	0	1	1	0	0	0	1	0	0		0	0%
Total	288		25	25	26	46	40	41	20	22	10	33		55	

The RRI program reached a broad range of institutions, with applications coming from 148 institutions, with several from outside the United States (American University of Beirut and the University of Zagreb). Table 11 lists the applications and awards for those organizations that received 2 or more of the RRI awards.

Table 11: Application and Awards from Organizations with More Than Two Awards

Organization	Total Applications	Percent of Total Applications	Total Awards	Percent of Total Awards
Fordham University	3	1%	2	4%
H. Lee Moffitt Cancer Center & Research Institute	4	1%	3	6%
Harvard University (School Of Public Health)	4	1%	2	4%
Health Partners Research Foundation	4	1%	3	6%

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Massachusetts General Hospital	4	1%	2	4%
University Of California San Francisco	13	4%	2	4%
University Of Minnesota Twin Cities	8	3%	3	6%
University Of Oklahoma Norman	5	2%	3	6%
Virginia Commonwealth University	5	2%	2	4%
Wayne State University	8	3%	2	4%

Topics Submitted and Funded under the Research on Research Integrity Program

Of the 290 applications under study, each abstract was read and the project assigned to at least one of 16 Topic categories. A description of each of the Topic categories is included in Appendix A. The applications and awards received for each topic under the FOA's issued through 2007 are presented in Table 12, and those topics received by NCRR since 2007 are presented in table 15. In this analysis, some abstracts were coded with more than one Topic category and therefore the totals do not match the distinct number of applications and awards.

Table 12: Research Integrity Applications and Awards from 2001-2007, by Topic Category

Topic	NS01-008		NS02-005		NS03-001		NS04-001		NS05-003		NR06-001		NR07-001		Total		%	
	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw
Animal Welfare																	0%	0%
Conflict of interest	4	1	1	0	2	2	6	1	5	0	7	1	1	1	**26**	**6**	**7%**	**7%**
Data management	1	1					5	0	2	1	2	0	3	2	**13**	**4**	**3%**	**5%**
Economic, policy, scientific impacts					1	0	2	0	2	1	2	0			**7**	**1**	**2%**	**1%**
RCR Education	3	0	10	5	6	1	9	1	8	0	4	0	4	1	**44**	**8**	**11%**	**10%**
Enhance/Undermine Integrity	3	2	6	2	5	3	15	2	16	1	14	0	5	1	**64**	**11**	**16%**	**13%**
Research Environment	4	2	6	2	5	2	16	2	16	2	9	0	7	0	**63**	**10**	**16%**	**12%**
Human Subjects Research	5	2	5	2	7	1	8	3	5	2	19	3	7	1	**56**	**14**	**14%**	**17%**
Research record	0	0	1	1	0	0	5	1	2	0	0	0	3	2	**11**	**4**	**3%**	**5%**
Funding Peer Review							1	1					1	0	**2**	**1**	**1%**	**1%**
Publication Practices	1	0	5	2	4	1	4	0	6	0	4	0	1	1	**25**	**4**	**6%**	**5%**
Disciplinary Perspectives	1	0	1	1	1	1	1	1	2	0	3	0	0	0	**9**	**3**	**2%**	**4%**
Collaborations, Relationships	1	0					4	0	5	2	5	0	1	1	**16**	**3**	**4%**	**4%**
Research norms	1	0	1	0	2	2	3	1	5	1	4	0	1	1	**17**	**5**	**4%**	**6%**
Handling Misconduct	3	2	1	0	7	1	4	0	5	1	3	1	1	0	**24**	**5**	**6%**	**6%**
Standards	3	0	3	2	2	0	2	0	3	1	2	0	2	0	**17**	**3**	**4%**	**4%**
Total	30	10	40	17	42	14	85	13	82	12	78	5	37	11	**394**	**82**		

Among the first round of 7 FOAs using the R01 mechanism, the most frequent topic categories for applications and awards were:
- Factors that enhance or undermine integrity
- Fostering a commitment to responsible conduct in research; Influence of the research environment; Institutional climate and responsibility
- Human Subjects Research
- Education on the responsible conduct of research (RCR) and Mentor/trainee responsibilities

One of those topics, "Human Subjects Research", was represented higher among awards than applications, as denoted by blue shading in Table 12. Applications to these topics were received favorably during the peer-review process, possibly due to the fact that they were considered more innovative or compelling topical areas.

Table 13: Research Integrity Applications and Awards from 2007-2009, by Topic Category

Topic	RR07-003		RR07-004		RR09-004		RR10-001		Total		%	
	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw	Ap	Aw
Animal Welfare					1	0	1	1	2	1	1%	0%
Conflict of interest	1	0			1	0	3	0	5	0	4%	0%
Data management	3	0			1	0	1	0	5	0	4%	0%
Economic, policy, scientific impacts	1	0	1	0					2	0	1%	0%
RCR Education	5	1			2	1	5	1	12	3	9%	14%
Enhance/Undermine Integrity	5	1			6	3	5	0	16	4	12%	29%
Research Environment	7	1			5	2	4	1	16	4	12%	21%
Human Subjects Research	3	0			6	2	9	0	18	2	13%	14%
Research record	0	0			1	0	1	0	2	0	1%	0%
Funding Peer Review	1	0			0	0	1	0	2	0	1%	0%
Publication Practices	2	0			4	0	4	0	10	0	7%	0%
Disciplinary Perspectives					1	0			1	0	1%	0%
Collaborations, Relationships	2	1			10	1	14	1	26	3	19%	14%
Research norms	3	0			1	0	5	1	9	1	7%	0%
Handling Misconduct	3	1			2	0			5	1	4%	7%
Standards	1	0			1	0	4	0	6	0	4%	0%
Total	37	5	1	0	42	9	57	5	137	19		

As Table 13 demonstrates, the topic of "Research collaborations and issues that may arise from such collaborations; Integrity and research relationships" was most frequently received, followed by the same topics received under the first 7 FOAs. The previously popular topics were more highly represented among the awards (blue shading), but

collaborations, relationships was not. The interest in understanding specifically how collaborations impact research integrity may reflect an increase in the research community's interest in "Team Science" and the special challenges collaborations pose. Overall the RRI program at NIH has generally funded research projects that are of interest to the community, as measured by proportion of topics applied for and awards received. However under the R03 and R21 mechanisms, many topics have not been awarded, although this series of FOA's has funded fewer grants overall.

In Table 14, a select list of the Medical Subject Headings (MeSH) applied by the National Library of Medicine to publications found for funded investigators are organized by FOA. The presence of relevant MeSH headings such as "Conflict of Interest", "Scientific Misconduct", "Ethics, Research", "Ethics, Professional", "Plagiarism", "Publications" and "Bioethics" is consistent with the topics of awards made under this program.

Table 14: Expertise of RRI Principal Investigators

FOA	Expertise List
NS01-008	Ethics, Research; Ethics, Professional; Psychology; Research Personnel; Confidentiality; Case-Control Studies; Environmental Exposure; Stress, Psychological; Ethics Committees, Research; Decision Making; Occupational Exposure; Genetic Predisposition to Disease; Mass Screening
NS02-005	Decision Making; Nurse's Role; Ethics, Research; Scientific Misconduct; Randomized Controlled Trials as Topic; Abstracting and Indexing as Topic; Ethics, Institutional; Social Support; Research Design; Technology Assessment, Biomedical; Attitude to Health; Ethics, Nursing; Faculty, Nursing; Publishing; Malpractice; Education, Nursing, Continuing; Computer Simulation; Research; Social Responsibility; Program Development; Ethics, Professional; Cost-Benefit Analysis; Qualitative Research; Health Services Needs and Demand; Attitude of Health Personnel
NS03-001	Biomedical Research; Publishing; Ethics, Research; Disclosure; Scientific Misconduct; Clinical Trials as Topic; Decision Making; Survival Rate; Informed Consent; Intellectual Property; Truth Disclosure; Attitude of Health Personnel; Stress, Psychological; Outcome Assessment (Health Care); Medical Errors; International Cooperation; Cross-Sectional Studies; Periodicals as Topic; Physicians; Authorship; Registries;
NS04-001	Ethics, Research; Scientific Misconduct; Health Knowledge, Attitudes, Practice; Biomedical Research; Decision Making; Clinical Trials as Topic; Attitude of Health Personnel; Computer Simulation; Substance-Related Disorders; Research Design; Informed Consent; Computer-Assisted Instruction; Violence; Mental Disorders; Education, Medical; Ethics, Professional; Data Collection; Smoking; Science; Sex Factors;
NS05-003	Ethics, Research; Scientific Misconduct; Conflict of Interest; Informed Consent; Interviews as Topic; Health Knowledge, Attitudes, Practice; Research Support as Topic; Communication
NR06-001	Biomedical Research; Physician-Patient Relations; Ethics, Research; Attitude of Health Personnel; Clinical Trials as Topic; Prevalence; Health Care Reform; Informed Consent; Pilot Projects; Mental Disorders; Disclosure; Truth Disclosure; Research Design; Decision Making; Conflict of Interest; Terminal Care; Cooperative Behavior; Ethics, Medical;
NR07-001	Ethics, Research; Data Collection; Health Services Research; Physician-Patient Relations; Decision Making; Interviews as Topic; Rural Health; Mental Health Services; Scientific Misconduct; Curriculum; Program Development; Case-Control Studies; Needs Assessment; Attitude of Health Personnel; Community Health Services; Mental Disorders; African Americans; Health Services Accessibility; Academic Medical Centers; Health Policy; Professional Practice; Decision Support Techniques; Longitudinal Studies; Predictive Value of Tests; Patient Acceptance of Health Care; Physician's Practice Patterns; Activities of Daily Living; Quality of Life; Biomedical Research; Nursing Research; Primary Health Care; Clinical Trials as Topic
RR07-003	Health Services Research; Multivariate Analysis; Health Knowledge, Attitudes, Practice; Mass Screening; Cooperative Behavior; Scientific Misconduct; Ethics, Research; Social Values; Health Education; Mental Health Services; Guidelines as Topic; Needs Assessment; Organizational Policy; Total Quality Management; Prostate-Specific Antigen; Physician's Practice Patterns; Interviews as Topic; Employment; Health Promotion; Community Networks; Physician-Patient Relations; Referral and Consultation; Attitude of Health Personnel; Primary Health Care
RR07-004	Plagiarism; Publications; Copyright
RR09-004	Curriculum; Patient Selection; Substance-Related Disorders; Cohort Studies; Guideline Adherence; Bioethics; Risk Assessment; Mental Health Services; Health Services Research; Violence; Ethics, Research; Research; African Americans; Attitude to Health

RR10-001	European Continental Ancestry Group; Biomedical Research; Reproducibility of Results; Ethics, Research; Hypertension; Curriculum; Science; Activities of Daily Living; Young Adult; African Continental Ancestry Group; Prevalence; Patient Selection; Research Personnel

However, many of the other terms relate to research into healthcare delivery and methods for conducting clinical trials. These additional terms may reflect the phenomenon of social scientists who are studying biomedical research and healthcare delivery methods becoming interested in research on research integrity, but may indicate the limitations of using the MeSH hierarchy for identifying research integrity focused publications.

Analysis of the Review of Applications to the Research on Research Integrity Program

As the field was quite new when the RRI program was initiated in 2001, it is important to evaluate aspects of the peer-review process to understand how applications received under this program were reviewed. To do this we identified the Study Sections that received applications and identified the individuals who served on those review panels from the IMPACII database. At the time of this review in October 2010 when the data were collected for this analysis, no reviewer information was available for the study section for RR10-001, identified as ZRR1 CR-2 (01), and therefore subsequent analyses on reviewers do not include this RFA.

Table 15 illustrates that all RRI applications were reviewed in Special Emphasis Panels (SEPs) with the NINDS FOAs reviewed in 4 different NINDs SEPs, the NINR FOAs reviewed by the Center for Scientific Review's SEP, and NCRR's FOAs reviewed in 1 NCRR SEP. Although 2 of the 4 NINDs SEPs have the lowest award rates overall for the set of 7 SEPs, the overall Award Rate for the combined NINDs SEPs is 20.9%.

Using guidance from ORI and OEP program staff, individuals who were known to have served as administrators during the review process and not reviewers were removed from the analysis.

Table 15: Review Panel Degree Types for Research Integrity Applications

Study Section	RFAs Included	Apps	Awds	Awd Rate	# Rvrs	Reviewer Degree Types								
						PhD	MD	MD PhD	JD	MS	MPH	MSN RN	EdD	Oth
ZNS1 SRB-H (01)	NS01-008 NS02-005	45	17	37.8%	28	20	4	1	0	0	0	4	1	3
ZNS1 SRB-H (02)	NS02-005 NS03-001	25	5	20.0%	20	15	3	2	2	1	1	0	0	1
ZNS1 SRB-H (15)	NS02-005 NS03-001 NS04-001	46	5	10.9%	24	17	5	1	3	0	0	2	0	0
ZNS1 SRB-H (25)	NS03-001 NS04-001 NS05-003	47	7	14.9%	25	21	3	1	3	1	0	1	0	0
ZRG1 HOP-S (50) and (51)	NR06-001 NR07-001	61	12	19.7%	25	22	4	1	1	2	2	1	0	3
ZRR1 CR-9 (01)	RR07-003 RR07-004 RR09-004	42	7	16.7%	22	19	6	2	0	0	0	2	0	0
	Total	**266**	**53**	**19.9%**	**148**	**114**	**25**	**8**	**9**	**4**	**3**	**10**	**1**	**7**

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Note: Number of reviewer Degree Types may be more than the total number of Reviewers per each study section as reviewers can be counted twice if they have more than one degree type other than MD/PhD.

Where available we identified degree information for these reviewers as a proxy to understand more about their qualifications. The vast majority of reviewers assigned to these 7 study sections held PhDs and MDs. A minority of reviewers held alternative degrees, such as JDs, EdD, MPH and MSN/RNs. These degree types are consistent with the complex nature of the topics under review in the RRI programs.

In order to determine the research expertise of the reviewers, we analyzed the MeSH terms that are associated with reviewer publications. For each study section a select list of the most commonly occurring MeSH terms are presented in Table 16 below.

As observed for the RRI funded investigators above, we see common MeSH terms associated with research on biomedical science and healthcare delivery. However, we do see topics associated with RRI such as "Ethics, Research", "Ethics, Professional", "Publishing", "Conflict of Interest", "Professional Role", "Scientific Misconduct", "Trust", and "Disclosure". As compared to the investigator's publications examined above there were fewer relevant terms identified suggesting that the reviewers are publishing more papers assigned biomedical research related terms or the reviewers are less likely to be themselves in the field of Research Integrity. Close examination of a subset of study sections may reveal sufficient information to determine which of these possibilities is occurring. Because MeSH terms are assigned to reveal the biomedical topics of papers indexed in PubMed, the analysis presented here does not fully reflect the expertise of those reviewers who are publishing in non-biomedical science fields, such as law or ethics.

Table 16: Expertise of RRI Review Panels

| Study Section	Years	Award Rate	Expertise List (select research topics)
ZNS1 SRB-H (01)	2001 2002 2003	37.8%	Biomedical Research; Social Responsibility; Ethics, Research; Ethics, Professional; Socioeconomic Factors; Publishing; Conflict of Interest; Professional Role; Acute Disease; Societies, Scientific; Risk Assessment; Disclosure
ZNS1 SRB-H (02)	2003	20.0%	Data Collection; Faculty, Medical; Neuropsychological Tests; Policy Making; Scientific Misconduct; Research Support as Topic; Biomedical Research; Attitude of Health Personnel; Conflict of Interest; Education, Graduate; Cognition Disorders; Risk Assessment; Interviews as Topic;
ZNS1 SRB-H (15)	2004	10.9%	Clinical Trials as Topic; Neuropsychological Tests; Faculty, Medical; Cross-Sectional Studies; Research; Risk Assessment; Attitude of Health Personnel;
ZNS1 SRB-H (25)	2005	14.9%	Ethics, Professional; Risk Assessment; Clinical Trials as Topic; Attitude of Health Personnel; Decision Making; Patient Selection; Mental Disorders; Ethics, Research; Commitment of Mentally Ill; Coercion
ZRG1 HOP-S (50) and ZRG1 HOP-S (51)	2006 2007	19.7%	Decision Making; Biomedical Research; Ethics, Professional; Informed Consent; Clinical Trials as Topic; Ethics, Research; Research Design; Patient Participation; Ethics Committees, Research; Social Responsibility; Acute Disease; Patient Selection; Scientific Misconduct; Social Justice; Conflict of Interest; SEER Program; Cross-Sectional Studies; Patient Selection; Research Subjects
ZRR1 CR-9 (01)	2008 2009 2010	16.7%	Decision Making; Adaptation, Psychological; Ethics, Professional; Ethics, Research; Scientific Misconduct; Biomedical Research; Research Design; African Americans; Nurse's Role; Physician-Patient Relations; Trust; Research Personnel; Attitude to Health

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The RRI program is an RFA with a set-aside budget allocation - regardless of the number of applications received, the number of awards is tied to the funding available. Because of this, the likely explanation for the lower award rates for the ZNS1 SRB-H (15) and (25) SEPs is that these SEPs were reviewing applications just after the doubling of the NIH budget was completed and each experienced an increase of applications over the previous review section (see Table 15).

A closer look at the scoring behavior of these review panels is presented in Table 17 below. Only applications submitted thru May 2008 are included due to the changes in priority scoring that were instituted in 2009. As can be seen, the high percentage of unscored applications (63%) for ZNS1 SRB-H (15) is consistent with the low award rate for this study section. Often during lead up to the review panel, program staff and review officers discuss the appropriate number of applications to discuss and this is largely tied to the funding set aside for the RFA. Therefore, increases in the number of applications received does not mirror increases in the numbers awarded and it is not warranted to compare the percent of unscored applications to the quality of those applications.

Table 17: Priority Score by Study Section of Select RRI Applications

Study Section	Appls	Unscrd	% Unscrd	Scored Mean	Funded Mean	Unfunded Mean	Scored Min	Funded Max	Rejected Min	Scored Max
ZNS1 SRB-H (01)	45	15	33%	250	191	327	126	265	253	380
ZNS1 SRB-H (02)	25	11	44%	296	156	373	133	183	268	474
ZNS1 SRB-H (15)	46	29	63%	231	189	248	148	219	176	310
ZNS1 SRB-H (25)	47	13	28%	220	152	237	130	192	164	293
ZRG1 HOP-S (50) and (51)	61	26	43%	232	175	262	159	193	174	400
ZRR1 CR-9 (01)	23	10	43%	231	173	249	161	180	185	349
Total	**247**	**104**	**42%**							
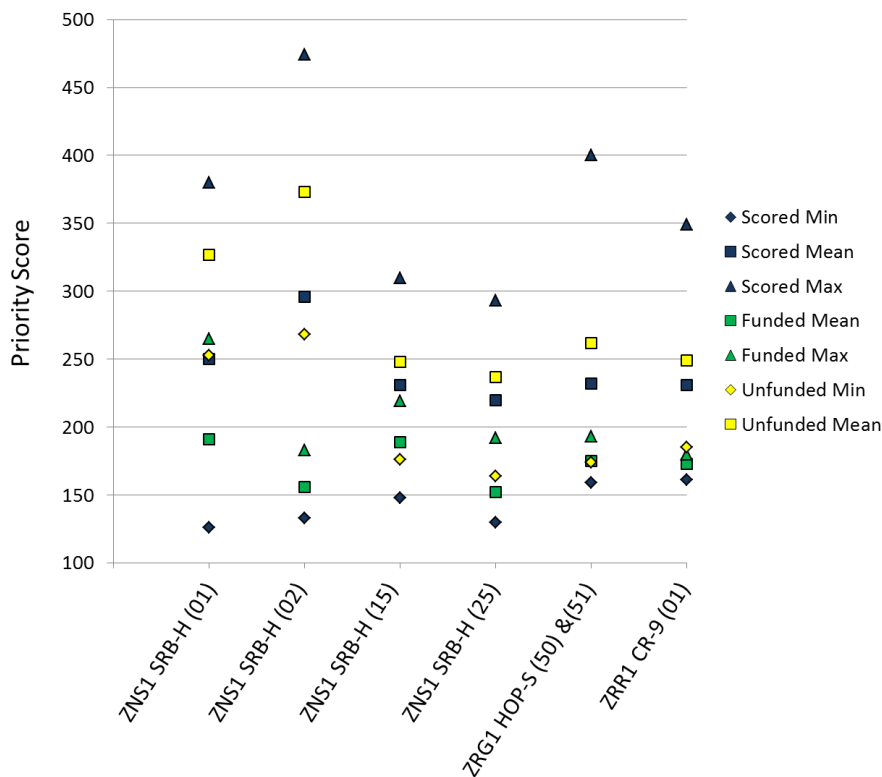
Figure 1: Priority Score Analysis by Study Section of Select RRI Applications

As shown in Figure 1, ZNS1 SRB-H (02) shows the greatest difference between the overall mean of all scored applications and the mean of the funded applications as well as it is the only study section with a substantial difference between the highest scored funded application and the lowest scored unfunded application (83 points). This is consistent with applications falling into two scoring modes based on quality.

Table 18 below compares the mean priority score for RRI applications with those received under the Human Subjects Research (HSR) Ethics program managed by the Office of Extramural Research. It is interesting to note that in most cases, the Research Integrity application priority scores were lower than those of the HSR Ethics program, with the exception of FY 2003 and 2006.

Table 18: Priority Score Analysis of Select RRI Applications

FY	RRI Applications	HSR Ethics Applications	RRI Mean Priority Score	HSR Ethics Mean Score	RRI Median Priority Score	HSR Ethics Median Score
2001	13	5	**263**	309	**265**	323
2002	16	11	**241**	284	**223**	300
2003	15	14	290	**260**	301	**260**
2004	17	7	**230**	288	**219**	299
2005	34	14	**219**	246	**226**	234.5
2006	22	8	245	**205**	241	**191.5**
2007	13	14	**209**	234	**191**	217

To understand more about how well the RRI review panel composition is serving the program, additional analysis looking at the overall pool of research integrity researchers and those selected for review panels at NIH is suggested.

Analysis of Research on Research Integrity Impact

One of the important goals of the Research on Research Integrity grant program is to contribute significantly to this field through publications. Bibliometric measures such as the journal impact factor and the number of times a paper has been cited provide information on the quality and impact of RRI publications and demonstrate the value of the RRI program. Using the MEDLINE database, research publications that acknowledge grant support from one of the 53 RRI grants were identified (a full list of the publication citations can be found in Appendix B). While this method does not identify all publications that may have benefited from RRI research support, prior analyses have shown that close to 70% of publications reported on grant progress reports acknowledge support in the MEDLINE database. Articles in the area of Research on Research Integrity are likely to be published in journals focused on legal and social subjects, and while MEDLINE indexes many of these journals, it is not a comprehensive database. Therefore, it is important to note that the analysis of publications to date represents the minimum number of papers produced by the RRI program projects. A more comprehensive analysis would require substantial manual review of the publications listed in grant progress reports and using manual searches of MEDLINE and other publication databases, such as Thomson Reuters' Web of Science.

As shown in Table 19, almost half (25) of the projects funded to date have produced publications. 57 distinct papers have been published and the average number of publications per project is 1.2. The average Median Journal Impact Factor per project is a respectable 4.5 and the maximum Median Journal Impact Factor per project is 44, which is near the top of the scale. The average Total Times Cited per project is 17, and the average Median Times Cited per Project is 6. Grant Number R01NS044417 entitled "EQUIPOISE AND THE RESEARCH INTEGRITY OF CLINICAL TRIALS" from Benjamin Djulbegovic has 8 papers and grant number R01LM009758 "DUPLICATE ARTICLE/PLAGIARISM DISCOVERY" from Harold Garner has produced 7 publications. Among Dr. Djulbegovic's publications is one that has been cited 76 times, the most among all of the RRI publications. Michelle Mello's Grants R01NS042438 and R01NS046777 on "INDUSTRY-SPONSORED RESEARCH CONTRACTS" produced two publications, one of which was published in a journal with a very high impact factor of 44. These publications demonstrate that NIH-supported RRI projects are having an impact on research on research integrity.

The topics of the projects that produced publications reflect that of the most frequent applications and awards:

- Education on the responsible conduct of research (RCR) and Mentor/trainee responsibilities
- Factors that enhance or undermine integrity
- Fostering a commitment to responsible conduct in research; Influence of the research environment; Institutional climate and responsibility
- Integrity and the reliability of the research record
- Integrity of peer review in determining merit for research funding
- Integrity of publication practices and responsible authorship
- Human Subject Research

It is expected that projects funded in the later years of the RRI program will begin to produce publications after more time. As research papers will continue to be published and to be cited in the literature, it is recommended that additional evaluation research publications be conducted in several years to allow for more time for research projects within RRI to have an impact.

Table 19: RRI Project Research Impact - Publication Productivity

Project Start FY	Grant Number	PI Name	Project Topic	Number of Pubs	Med JIF	Total Times Cited*	Max Times Cited	Med Times Cited
2001	R01NR008090	Martinson, Brian	Research Environment, Enhance/Undermine Integrity	4		70	24	17
2001	R01NS042398	Bero, Lisa	Conflict of interest	2	3.7	14	14	14
2001	R01NS042449	Gardner, William	Human Subjects Research, Handling Misconduct	1		12	12	0
2001	R01NS042454	Koocher, Gerald	Human Subjects	1		5	5	0
2002	R01NS042438	Mello, Michelle	Research Environment, Enhance/Undermine Integrity, Standards	2	44.0	51	51	51
2002	R01NS042494	Macrina, Francis	RCR Education	2		0	0	0
2002	R01NS044417	Djulbegovic, Benjamin	Human Subjects Research, Research Record	8	2.9	113	76	0
2002	R01NS044487	Neale, Anne	Publication Practices	2	0.44	3	3	3
2002	R01NS044500	Bero, Lisa	Publication Practices	1		21	21	0
2002	R01NS044527	Jacobsen, Steven Mcgee, Richard	RCR Education	1		0	0	0
2002	R01NS044533	Heitman, Elizabeth	RCR Education, Enhance/Undermine Integrity	2	2.6	5	5	5
2003	R01NR008802	Broome, Marion Habermann, Barbara	Human Subjects Research, Enhance/Undermine Integrity, Research Environment	5	1.24	7	5	1
2003	R01NS044486	Burke, Wylie	RCR Education, Research Environment	2	2.6	1	1	1
2003	R01NS044523	Tereskerz, Patricia	Conflict of Interest, Disciplinary Perspectives, Enhance/Undermine Integrity	1		1	1	0
2003	R01NS046777	Mello, Michelle	Research Environment, Enhance/Undermine Integrity	2	44.0	51	51	51
2004	R01NS049535	Mumford, Michael	RCR Education, Research Environment, Enhance/Undermine Integrity	2	2.6	1	1	1
2004	R01NS049548	Taekman, Jeffrey	Research Record, Human Subjects Research	1		0	0	0
2004	R01NS049595	Lidz, Charles	Research Norms, Human Subjects Research	1		0	0	0
2005	R01AA016191	Gorman, Dennis	Data Management, Handling Misconduct, Economic, Policy, Scientific Impacts	1		0	0	0
2005	R01NS052885	Martinson, Brian	Research Environment	2		0	0	0
2005	R01NS052956	Djulbegovic, Benjamin	Human Subjects Research	4		25	13	0
2006	R01GM080071	Slaughter, Sheila	Conflict of interest	1		1	1	0
2006	R01HG004214	Klitzman, Robert	Human Subjects Research	2	3.3	1	1	1
2007	R01CA133594	Djulbegovic, Benjamin	Human Subjects Research	2		0	0	0
2007	R01LM009758	Garner, Harold	Publications Practices, Research Record	7	4.9	33	19	3
			TOTAL	59	4.5	17	12	6

*Times Cited excludes self-citation.

Summary and Recommendations for Future Analysis

The RRI program has funded 55 awards over the last 10 years, supporting a diverse research community through a series of FOAs. The RRI funding rate over this period has been 19%, which is lower than all projects involving human subjects during a similar time frame (27%) and higher than initial applications received to the Human Subjects Research Ethics, or Bioethics (9.6%). This competitive environment is likely due to a combination of the fact that the RRI program is a set-aside program and receives many applications and the nature of the applications themselves, which is supported by anecdotal observations that many of the initial applications and awards for the R01 mechanisms in RRI were found to be less innovative and experimental than what the program intended.

The applicant pool is diverse in terms of gender, but not race/ethnicity, and it appears that applicants do have a degree of expertise in research integrity topics such as "Scientific Misconduct", "Conflict of Interest" and "Research Ethics". Review of the RRI applications has been carried out by Special Emphasis Panels, and an analysis of the expertise of panel members suggests that many reviewers come from a biomedical research background and more can possibly be done to identify experts in other areas pertinent to Research Integrity to serve in the peer-review process. Finally, almost half of the RRI projects funded by NIH have produced research publications, some of which are in high impact journals and have been cited by subsequent literature many times.

This program evaluation of the RRI initiative has provided measureable evidence about the value of the program. However, the following are several additional evaluation points that are recommended for future follow up:

- **Research Field of Applicant and Awardee**: This study used MeSH terms as a proxy for the research areas of the RRI investigators and study section reviewers. Additional information could be provided through both automated and manual methods, including matching investigators to NSF's Doctoral Record File and the AAMC Faculty Roster, both of which are available to NIH program staff for evaluation. Additional information about the research field will provide OEP and ORI with more information about the pool of applicants interested in NIH support for this research.
- **Review Panel Composition**: Initial analysis of the expertise of RRI study section members suggests that review members often move into research integrity studies after a career in biomedical research. An in-depth analysis of the field of RRI investigators and a determination of whether prominent researchers are participating in RRI review panels is recommended. This analysis would identify researchers publishing in Web of Science on topics related to Research Integrity as well as recipients of similar grants from federal agencies other than the NIH. Identification of this larger pool of reviewers would provide information to help guide the creation of study section panels best able to evaluate RRI applications.
- **Expanded Publication Analysis**: This evaluation found that close to half of the RRI projects has produced publications. Two additional analyses of the impact of all RRI projects are recommended. First, information about the publications in the field of Research Integrity broadly would permit a comparison of the quality and impact of publications produced by the RRI projects compared to the field. Second, a follow up study of the publications produced by the RRI funded grants is recommended after sufficient time has elapsed to allow more recently funded projects to publish research findings.
- **Training Materials Produced**: Many of the RRI projects funded are intended to produce materials that are used to train researchers and fellows in the responsible conduct of research (RCR). It is recommended to collect data on these materials produced by different RRI projects, in the form of course materials or websites and to evaluate these as an additional output of the RRI program.

Appendix A: Topic Definitions

Topic Label	Topic	Description
Conflict of interest	Conflict of interest	Studies in this category generally address how conflicting interests might impact the conduct and results of research; how individuals, research institutions, and professional societies recognize and manage conflicts of interest; whether financial conflicts of interest are a growing concern in research, and if so, what impact they have on research conduct and results; whether existing conflict of interest policies are known in the research community and whether such policies are effective in addressing the potential impact of such conflicts on research.
Data management	Data acquisition, management, sharing, and ownership	Seeks to determine the accepted practices for acquiring and maintaining research data and to identify the proper methods for record keeping and electronic data collection and storage in scientific research (i.e., defining what constitutes data; keeping data notebooks or electronic files; data privacy and confidentiality; data selection, retention, sharing, ownership, and analysis; data as legal documents and intellectual property, including copyright laws).
Economic, policy, scientific impacts	Economic, policy, and scientific impacts	These studies address the impact of behaviors that contravene rules, regulations, guidelines, and commonly accepted professional codes or norms on economic, policy and scientific products. In particular, this includes developmental or exploratory studies that will provide data and guidance in interpreting data on: (i) the actual dollar costs of misconduct cases in terms of wasted grant funds, added faculty and staff time to conduct investigations, wasted efforts to duplicate fraudulent research, and the expense of retracting publications; (ii) the actual dollar costs of duplicate publication, the failure to share data in a timely manner, bias resulting from conflict of interest, and other questionable practices that slow the progress of science and waste research time and funding (iii) the identification and extent of misconduct and questionable research practices that compromise the reliability of the scientific record; (iv) the cause and degree that misconduct and questionable research practices improperly inform public policy or health decisions. [Taken from RR07-004 RFA]
RCR Education	Education on the responsible conduct of research (RCR) and Mentor/trainee responsibilities	Studies address whether RCR education has an effect on research integrity and, if so, to what extent. These studies seek to determine whether specific approaches to RCR education (i.e., mentoring, case study, class-room lectures) are more effective than others; to develop and identify methods or instruments that are best suited for assessing the effectiveness of RCR education; and to define the responsibilities of mentors and trainees in pre-doctoral and post-doctoral research programs (i.e., role or responsibilities of a mentor, conflicts between mentor and trainee, collaboration and competition, selection of a mentor, and Abusing the mentor/trainee relationship). These studies may investigate the impact of a specific training program for responsible conduct of research.
Enhance/Undermine Integrity	Factors that enhance or undermine integrity	Although integrity is primarily a personal responsibility, these studies recognize that it can be and often is influenced by other factors and seeks to address the impact of factors such as the attitudes of mentors, colleagues, and institutional leaders; institutional priorities; the availability of different types of research funding; local, national and/or world events; and personal obligations.

Research Environment	Fostering a commitment to responsible conduct in research; Influence of the research environment; Institutional climate and responsibility	studies in this category seek to: (i) clarify and assess the importance of environmental elements that influence integrity in research; (ii) provide a comprehensive assessment (cost and elements) of specific institutional efforts to promote integrity in research; (iii) assess the impact of changes in significant environmental elements, such as funding patterns, major research priorities, and technology transfer, on research integrity; (iv) define and assess ways to study the impact of policies, procedures, practices, and other approaches to promote responsible research at the institutional, departmental, or laboratory level; and/or (v) develop and test assessment tools for institutions and laboratories to measure specific aspects of responsible research and research integrity; (vi) determine the amount of responsibilities accepted by research institutions and scientific societies for maintaining the integrity of their research programs and determine how they meet these responsibilities; (vii) determine whether research institutions or professional societies promote values that effectively encourage high standards for integrity; (viii) determine the impact of institutional climate on the attitudes and practices of individual researchers; and (ix) determine whether professional societies establish norms for acceptable research practices.
Research Record	Integrity and the reliability of the research record	Studies in this category address our understanding of the relationships among different aspects of integrity and the overall reliability of the research record. Proposals generally may: (i) define and assess the prevalence of research practices that depart from rules, regulations, guidelines, and commonly accepted norms for responsible conduct in research; (ii) assess the importance of specific questionable practices on the research record—e.g. poor data management, sloppy research, unmanaged conflicts of interest, the use of inappropriate methods, improper authorship, and partial or inaccurate reporting of research methods and findings; and/or (iii) develop and test ways to assess the reliability of the research record, including not only final publications but grant applications and professional statements.
Peer Review	Integrity of peer review in determining merit for research funding	Integrity of peer review in determining merit for research funding
Publication Practices	Integrity of publication practices and responsible authorship	include studies which address whether research results are quickly, fairly, and accurately disseminated; whether research is effectively self-correcting; the effectiveness of different approaches (e.g., peer review, data audits, or detailed research and publication guidelines) in encouraging and ensuring the integrity of the research record; the level of accountability among authors; and the prevalence of problems associated with collaborative work and assigning appropriate credit, acknowledgments, appropriate citations, repetitive publications, fragmentary publication, sufficient description of methods, corrections and retractions, conventions for deciding upon authors, author responsibilities, and the pressure to publish.
Disciplinary Perspectives	Relevant research perspectives and disciplines	Studies under this heading typically investigate whether one or several specific disciplines or fields as the focus of study with the hypothesis that there is a particular difference within that field. Studies comparing across disciplines are also included. Relevant research perspectives and disciplines include, but are not limited to: anthropology, applied philosophy, business, economics, education, information studies, law, organizational studies, health services, political science, psychology, public health, sociology, and survey and evaluation research, plus the physical, biomedical, and clinical sciences, including nursing.
Collaborations, Relationships	Research collaborations and issues that may arise from such collaborations; Integrity and research relationships	Studies in this category typically investigate methods of addressing research integrity through methods such as setting ground rules early in the collaboration, avoiding authorship disputes, and the sharing of materials and information with internal and external collaborating scientists. Studies generally: (i) investigate how collaborative research is organized and its impact on research integrity, with particular interest in clinical research; (ii) define and assess the influence of international collaboration on responsible research practices and the research record; (iii) investigate and assess the impact of changing financial relationships, such as SBIR grants, licensing agreements, and other financial arrangements, on research integrity and/or (iv) study the challenges for responsible conduct presented in high-profile collaborative and international research, e.g. AIDS and other major disease/health programs.

Research norms	Research norms and/or practices and Self-regulation	These studies address how researchers make decisions about what they should and should not do as professionals; determine whether workplace conditions and career pressures affect their decisions; determine what responsibilities investigators accept or reject and why; determine how investigators learn about these responsibilities, and how they define and deal with conflicting responsibilities.
Standards	Standards for responsible conduct	Studies addressing methods to define the standards for responsible conduct in research and their evolution fall in this category. These standards may include generally accepted but informal customs or more clearly defined standards and can vary from field to field or research setting to research setting (e.g. for designing experiments; recording, storing, interpreting and reporting data; or assigning authorship).
Handling Misconduct	Research policies and the meaning of research misconduct and the regulations, policies, and guidelines that govern research misconduct in PHS-funded institutions	Studies should determine how well current federal and institutional policies are known and understood by researchers; how effective those policies are in promoting responsible research conduct or in pursuing allegations of research misconduct; whether humans and animals are adequately protected when serving as participants in research projects; how pervasive fabrication, falsification, and plagiarism are; the difference between error vs. intentional misconduct; how effective institutional misconduct policies are; how effective institutional structures are in identifying misconduct; how effective the procedures for reporting misconduct are; the protection of whistleblowers; and outcomes of investigations, including institutional and Federal actions.
Human Subjects Research	Human Subjects Research	Studies should address interactions between researchers and institutional review boards (IRBs); whether the training of physician-scientists is adequate; ethical preparedness and performance of study co-coordinator; and the adequacy of consent procedures.
Animal Welfare	Animal Welfare in Research	Studies addressing interactions between researchers and institutional animal care and use committees (IACUCs) including models for quality control including regulations, training and supervisory practices that address use of animals.

Appendix B: Research on Research Integrity Grant Portfolio Publications

Project FY	PMID	Author List	Title of Article	Journal Title	Article Year	Volume Issue Pages	Times Cited	Impact Factor	Times Not Self Cited
2002	14703540	Heloisa P Soares; Stephanie Daniels; Ambuj Kumar; Mike Clarke; Charles Scott; Suzanne Swann; Benjamin Djulbegovic; Radiation Therapy Oncology Group	Bad reporting does not mean bad methods for randomised trials: observational study of randomised controlled trials performed by the Radiation Therapy Oncology Group.	BMJ (Clinical research ed.)	2004	328(7430):22-4	81	9.052	73
2001	15046145	Elizabeth A Boyd; Shira Lipton; Lisa A Bero	Implementation of financial disclosure policies to manage conflicts of interest.	Health affairs (Project Hope)	2004	23(2):206-14	19	3.68	14
2002	15728168	Heloisa P Soares; Ambuj Kumar; Stephanie Daniels; Suzanne Swann; Alan Cantor; Iztok Hozo; Mike Clark; Fadila Serdarevic; Clement Gwede; Andy Trotti; Benjamin Djulbegovic	Evaluation of new treatments in radiation oncology: are they better than standard treatments?	JAMA : the journal of the American Medical Association	2005	293(8):970-8	16	23.494	11
2001	15837444	William Gardner; Charles W Lidz; Kathryn C Hartwig	Authors' reports about research integrity problems in clinical trials.	Contemporary clinical trials	2005	26(2):244-51	13	1.333	12
2002	15917385	Michelle M Mello; Brian R Clarridge; David M Studdert	Academic medical centers' standards for clinical-trial agreements with industry.	The New England journal of medicine	2005	352(21):2202-10	51	44.016	50
2003	15917385	Michelle M Mello; Brian R Clarridge; David M Studdert	Academic medical centers' standards for clinical-trial agreements with industry.	The New England journal of medicine	2005	352(21):2202-10	51	44.016	50
2003	16275698	Duck-Hee Kang; Linda Davis; Barbara Habermann; Marti Rice; Marion Broome	Hiring the right people and management of research staff.	Western journal of nursing research	2006	27(8):1059-66	1	1.24	1
2002	16299015	Ambuj Kumar; Heloisa Soares; Robert Wells; Mike Clarke; Iztok Hozo; Archie Bleyer; Gregory Reaman; Iain Chalmers; Benjamin Djulbegovic; Children's Oncology Group	Are experimental treatments for cancer in children superior to established treatments? Observational study of randomised controlled trials by the Children's Oncology Group.	BMJ (Clinical research ed.)	2006	331(7528):1295	16	9.052	11
2005	16299015	Ambuj Kumar; Heloisa Soares; Robert Wells; Mike Clarke; Iztok Hozo; Archie Bleyer; Gregory Reaman; Iain Chalmers; Benjamin Djulbegovic; Children's Oncology Group	Are experimental treatments for cancer in children superior to established treatments? Observational study of randomised controlled trials by the Children's Oncology Group.	BMJ (Clinical research ed.)	2006	331(7528):1295	16	9.052	11

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2001	16353375	Lisa A Bero	Managing financial conflicts of interest in research.	The Journal of the American College of Dentists	2006	72(2):4-9	NULL	NULL	NULL
2003	16513921	Marti Rice; Marion E Broome; Barbara Habermann; Duck-Hee Kang; Linda L Davis	Implementing the research budget.	Western journal of nursing research	2006	28(2):234-41	1	1.24	1
2003	16578917	Marion E Broome; Erica Pryor; Barbara Habermann; Leavonne Pulley; Harold Kincaid	The Scientific Misconduct Questionnaire--Revised (SMQ-R): validation and psychometric testing.	Accountability in research	2006	12(4):263-80	NULL	NULL	NULL
2001	16578924	Patricia Keith-Spiegel; Gerald P Koocher	The IRB paradox: could the protectors also encourage deceit?	Ethics & behavior	2006	15(4):339-49	5	0.565	4
2002	16634168	Michelle M Mello; Brian R Clarridge; David M Studdert	Researchers' views of the acceptability of restrictive provisions in clinical trial agreements with industry sponsors.	Accountability in research	2006	12(3):163-91	NULL	NULL	NULL
2003	16634168	Michelle M Mello; Brian R Clarridge; David M Studdert	Researchers' views of the acceptability of restrictive provisions in clinical trial agreements with industry sponsors.	Accountability in research	2006	12(3):163-91	NULL	NULL	NULL
2002	16634171	Kirsten A Barrett; Carolyn L Funk; Francis L Macrina	Awareness of publication guidelines and the responsible conduct of research.	Accountability in research	2006	12(3):193-206	NULL	NULL	NULL
2002	16634172	Elizabeth Heitman; Ruth Ellen Bulger	Assessing the educational literature in the responsible conduct of research for core content.	Accountability in research	2006	12(3):207-24	NULL	NULL	NULL
2002	16803442	Kirby P Lee; Elizabeth A Boyd; Jayna M Holroyd-Leduc; Peter Bacchetti; Lisa A Bero	Predictors of publication: characteristics of submitted manuscripts associated with acceptance at major biomedical journals.	The Medical journal of Australia	2006	184(12):621-6	24	2.582	20
2001	16810336	Raymond de Vries; Melissa S Anderson; Brian C Martinson	Normal Misbehavior: Scientists Talk about the Ethics of Research.	Journal of empirical research on human research ethics : JERHRE	2009	1(1):43-50	27	NULL	22
2001	16810337	Brian C Martinson; Melissa S Anderson; A Lauren Crain; Raymond de Vries	Scientists' perceptions of organizational justice and self-reported misbehaviors.	Journal of empirical research on human research ethics : JERHRE	2009	1(1):51-66	21	NULL	15

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2003	17198285	Nicole Deming; Kelly Fryer-Edwards; Denise Dudzinski; Helene Starks; Julie Culver; Elizabeth Hopley; Lynne Robins; Wylie Burke	Incorporating principles and practical wisdom in research ethics education: a preliminary study.	Academic medicine : journal of the Association of American Medical Colleges	2007	82(1):18-23	1	2.607	1
2002	17401017	Ambuj Kumar; Heloisa P Soares; Lodovico Balducci; Benjamin Djulbegovic; National Cancer Institute	Treatment tolerance and efficacy in geriatric oncology: a systematic review of phase III randomized trials conducted by five National Cancer Institute-sponsored cooperative groups.	Journal of clinical oncology : official journal of the American Society of Clinical Oncology	2007	25(10):1272-6	16	13.598	13
2005	17401017	Ambuj Kumar; Heloisa P Soares; Lodovico Balducci; Benjamin Djulbegovic; National Cancer Institute	Treatment tolerance and efficacy in geriatric oncology: a systematic review of phase III randomized trials conducted by five National Cancer Institute-sponsored cooperative groups.	Journal of clinical oncology : official journal of the American Society of Clinical Oncology	2007	25(10):1272-6	16	13.598	13
2002	17454416	Benjamin Djulbegovic	Articulating and responding to uncertainties in clinical research.	The Journal of medicine and philosophy	2007	32(2):79-98	NULL	NULL	NULL
2003	17526690	Erica R Pryor; Barbara Habermann; Marion E Broome	Scientific misconduct from the perspective of research coordinators: a national survey.	Journal of medical ethics	2007	33(6):365-9	8	1.222	5
2002	17703606	Anne Victoria Neale; Justin Northrup; Rhonda Dailey; Ellen Marks; Judith Abrams	Correction and use of biomedical literature affected by scientific misconduct.	Science and engineering ethics	2007	13(1):5-24	4	0.44	3
2002	17726387	Elizabeth Heitman; Cara H Olsen; Lida Anestidou; Ruth Ellen Bulger	New graduate students' baseline knowledge of the responsible conduct of research.	Academic medicine : journal of the Association of American Medical Colleges	2007	82(9):838-45	6	2.607	5
2001	17726390	Melissa S Anderson; Aaron S Horn; Kelly R Risbey; Emily A Ronning; Raymond De Vries; Brian C Martinson	What do mentoring and training in the responsible conduct of research have to do with scientists' misbehavior? Findings from a National Survey of NIH-funded scientists.	Academic medicine : journal of the Association of American Medical Colleges	2007	82(9):853-60	22	2.607	20
2001	18030595	Melissa S Anderson; Emily A Ronning; Raymond De Vries; Brian C Martinson	The perverse effects of competition on scientists' work and relationships.	Science and engineering ethics	2008	13(4):437-61	6	0.44	5

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2007	18056062	Mounir Errami; Justin M Hicks; Wayne Fisher; David Trusty; Jonathan D Wren; Tara C Long; Harold R Garner	Déjà vu--a study of duplicate citations in Medline.	Bioinformatics (Oxford, England)	2008	24(2):243-9	22	4.894	17
2004	18074243	Vykinta Kligyte; Richard T Marcy; Ethan P Waples; Sydney T Sevier; Elaine S Godfrey; Michael D Mumford; Dean F Hougen	Application of a sensemaking approach to ethics training in the physical sciences and engineering.	Science and engineering ethics	2008	14(2):251-78	6	0.44	1
2002	18246945	Carolyn L Funk; Kirsten A Barrett; Francis L Macrina	Authorship and publication practices: evaluation of the effect of responsible conduct of research instruction to postdoctoral trainees.	Accountability in research	2008	14(4):269-305	NULL	NULL	NULL
2002	18298028	Richard McGee; Julka Almquist; Jill L Keller; Steven J Jacobsen	Teaching and learning responsible research conduct: influences of prior experiences on acceptance of new ideas.	Accountability in research	2008	15(1):30-62	NULL	NULL	NULL
2007	18362256	Benjamin Djulbegovic; Ambuj Kumar; Heloisa P Soares; Iztok Hozo; Gerold Bepler; Mike Clarke; Charles L Bennett	Treatment success in cancer: new cancer treatment successes identified in phase 3 randomized controlled trials conducted by the National Cancer Institute-sponsored cooperative oncology groups, 1955 to 2006.	Archives of internal medicine	2008	168(6):632-42	NULL	NULL	NULL
2002	18362256	Benjamin Djulbegovic; Ambuj Kumar; Heloisa P Soares; Iztok Hozo; Gerold Bepler; Mike Clarke; Charles L Bennett	Treatment success in cancer: new cancer treatment successes identified in phase 3 randomized controlled trials conducted by the National Cancer Institute-sponsored cooperative oncology groups, 1955 to 2006.	Archives of internal medicine	2008	168(6):632-42	NULL	NULL	NULL
2005	18362256	Benjamin Djulbegovic; Ambuj Kumar; Heloisa P Soares; Iztok Hozo; Gerold Bepler; Mike Clarke; Charles L Bennett	Treatment success in cancer: new cancer treatment successes identified in phase 3 randomized controlled trials conducted by the National Cancer Institute-sponsored cooperative oncology groups, 1955 to 2006.	Archives of internal medicine	2008	168(6):632-42	NULL	NULL	NULL
2007	18413326	Jonathan D Wren	URL decay in MEDLINE--a 4-year follow-up study.	Bioinformatics (Oxford, England)	2008	24(11):1381-5	7	4.894	6
2007	18757888	Mounir Errami; Zhaohui Sun; Tara C Long; Angela C George; Harold R Garner	Deja vu: a database of highly similar citations in the scientific literature.	Nucleic acids research	2009	37(Database issue):D921-4	7	6.317	4
2007	18793456	Cory B Giles; Jonathan D Wren	Large-scale directional relationship extraction and resolution.	BMC bioinformatics	2008	NULL	5	3.617	3

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2002	18803996	Patrick D Mauldin; Paulo Guimaraes; Roger L Albin; E Ray Dorsey; Jacquelyn L Bainbridge; Andrew Siderowf; NINDS NET-PD Investigators	Optimal frequency for measuring health care resource utilization in Parkinson's disease using participant recall: the FS-TOO resource utilization substudy.	Clinical therapeutics	2008	30(8):1553-7	0	2.893	0
2006	18829009	Robert Klitzman; Beata Zolovska; William Folberth; Mark V Sauer; Wendy Chung; Paul Appelbaum	Preimplantation genetic diagnosis on in vitro fertilization clinic websites: presentations of risks, benefits and other information.	Fertility and sterility	2010	92(4):1276-83	3	3.277	1
2007	19265004	Tara C Long; Mounir Errami; Angela C George; Zhaohui Sun; Harold R Garner	Scientific integrity. Responding to possible plagiarism.	Science (New York, N.Y.)	2009	323(5919):1293-4	NULL	NULL	NULL
2003	19353387	Patricia M Tereskerz; Ann B Hamric; Thomas M Guterbock; Jonathan D Moreno	Prevalence of industry support and its relationship to research integrity.	Accountability in research	2009	16(2):78-105	0	NULL	0
2002	19597966	Anne Victoria Neale; Rhonda K Dailey; Judith Abrams	Analysis of citations to biomedical articles affected by scientific misconduct.	Science and engineering ethics	2010	16(2):251-61	0	0.44	0
2006	19754230	Sheila Slaughter; Maryann P Feldman; Scott L Thomas	U.S. research universities' institutional conflict of interest policies.	Journal of empirical research on human research ethics : JERHRE	2009	4(3):3-20	1	NULL	1
2005	19858802	Brian C Martinson; A Lauren Crain; Melissa S Anderson; Raymond De Vries	Institutions' expectations for researchers' self-funding, federal grant holding, and private industry involvement: manifold drivers of self-interest and researcher behavior.	Academic medicine : journal of the Association of American Medical Colleges	2010	84(11):1491-9	NULL	NULL	NULL
2004	19873835	Charles W Lidz; Paul S Appelbaum; Steven Joffe; Karen Albert; Jill Rosenbaum; Lorna Simon	Competing commitments in clinical trials.	IRB	2010	31(5):1-6	NULL	NULL	NULL
2007	19910921	Benjamin Djulbegovic	The paradox of equipoise: the principle that drives and limits therapeutic discoveries in clinical research.	Cancer control : journal of the Moffitt Cancer Center	2010	16(4):342-7	NULL	NULL	NULL
2002	19910921	Benjamin Djulbegovic	The paradox of equipoise: the principle that drives and limits therapeutic discoveries in clinical research.	Cancer control : journal of the Moffitt Cancer Center	2010	16(4):342-7	NULL	NULL	NULL
2005	19910921	Benjamin Djulbegovic	The paradox of equipoise: the principle that drives and limits therapeutic discoveries in clinical research.	Cancer control : journal of the Moffitt Cancer Center	2010	16(4):342-7	NULL	NULL	NULL

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2003	20010045	Barbara Habermann; Marion Broome; Erica R Pryor; Kim Wagler Ziner	Research coordinators' experiences with scientific misconduct and research integrity.	Nursing research	2010	59(1):51-7	0	1.604	0
2004	20182131	Alison L Antes; Xiaoqian Wang; Michael D Mumford; Ryan P Brown; Shane Connelly; Lynn D Devenport	Evaluating the effects that existing instruction on responsible conduct of research has on ethical decision making.	Academic medicine : journal of the Association of American Medical Colleges	2010	85(3):519-26	0	2.607	0
2007	20472545	Mounir Errami; Zhaohui Sun; Angela C George; Tara C Long; Michael A Skinner; Jonathan D Wren; Harold R Garner	Identifying duplicate content using statistically improbable phrases.	Bioinformatics (Oxford, England)	2010	26(11):1453-7	0	4.894	0
2006	20663770	Robert Klitzman; Lisa Judy Chin; Hoda Rifai-Bishjawish; Kelly Kleinert; Cheng-Shiun Leu	Disclosures of funding sources and conflicts of interest in published HIV/AIDS research conducted in developing countries.	Journal of medical ethics	2010	36(8):505-10	NULL	NULL	NULL

Appendix C: Evaluation Data Files Provided

- Research on Research Integrity Data File
- Human Subjects Research Ethics Comparison Group Data File
- Research on Research Integrity Evaluation Report
- Research on Research Integrity Evaluation Slide Presentation