

1 **How competition for funding impacts scientific practice**

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20 practice, projectification, risky science

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26

27 **Abstract**

28

29 In the research integrity literature, funding enters in two different ways: as elevating
30 questionable research practices due to perverse incentives, and as being a potential player to
31 incentivize researchers to behave well. Other recent studies have emphasized the importance
32 of the latter, asking funding experts. Here, I explored how the impact of competitive research
33 funding on science is being perceived by active researchers. More specifically, I have
34 conducted a series of group sessions with researchers in two different countries with a
35 different degree of competition for funding, in three disciplinary fields (medical sciences,
36 natural sciences and the humanities), and with researchers in two different career stages
37 (permanent versus temporary employment). Researchers across all groups experienced that
38 competition for funding shapes science, with many unintended questionable side effects.
39 Intriguingly, these questionable effects had little to do with the type of questionable research
40 practices (QRP's) typically being presented in the research integrity literature. While the
41 notion of QRP's focuses on publications and assumes that there would essentially be a correct
42 way to do the science, researchers worried about the shaping of science via funding.
43 According to my session participants, rather than ending up as really being wrong, this
44 shaping could result in predictable, fashionable, short-sighted, and overpromising science.
45 And still, this was seen as highly problematic: scientists experienced that the
46 'projectification' of science makes it more and more difficult to do any science of real
47 importance: plunging into the unknown or addressing big issues that would need a long-term
48 horizon to mature.

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50

51 **Introduction**

52

53 There seems to be a crisis in science: surveys have recently found that many researchers
54 perform questionable research practices (Bouter et al., 2016; Kaiser et al., 2021; Xie et al.,
55 2021; Gopalakrishna et al., 2022). For example, they submit to selective reporting, p-hacking,
56 and HARK-ing in order to score good publications (Bouter, 2020, following Wichters et al.,
57 2016). Many research integrity scholars assume that it is the increasingly competitive nature
58 of science, and in particular the need for high-impact publications and funding, which may be
59 the main driver for individual researchers submitting to questionable research practices
60 (Martinson et al., 2005, 2006; Bouter, 2020).

61

62 While for a long time there had been a focus on the individual researcher behaving badly, the
63 focus in the research integrity debate has in recent years shifted away from individual
64 responsibilities (and spectacular cases of fraud) to aspects of scientific communities and
65 research climate. For example Zwart and ter Meulen (2019) have urged to investigate how
66 universities and funders could help fostering research integrity.

67

68 Funding thus enters nowadays in two highly different ways into the discussion around
69 research integrity: on the one hand, pressures on researchers to obtain funding are seen as
70 potentially elevating questionable research practices. On the other hand, funders are also seen
71 as potential agents to foster research integrity. How does this play out in practice, and what
72 happens according to whom?

73

74 Labib and her colleagues (2021; see also Meijlgard et al., 2020) have recently made a first
75 step to investigate how funding experts envision that they could help fostering research
76 integrity. Labib et al. (2021) established eleven themes from the RI literature with regards to
77 funding, and then asked funders about the significance of each theme. Using surveys, Labib
78 and colleagues could identify which themes funders themselves would find most important to
79 enhance responsible science. The top three themes that emerged in this way were “dealing
80 with breaches of RI, conflicts of interest, and setting expectations on RPO’s (= research
81 performing organizations)” (Labib et al., 2021). Funders were thus also seen as being able to
82 impose requirements on research organizations with regards to research integrity of their

83 employees (see also Roje et al., 2021 for a similar finding emerging from funding experts in
84 focus group interviews).

85

86 What is currently lacking is the perspective from active researchers: how do researchers
87 themselves experience the impact from funders on questionable research practices? And how
88 does higher or lower competition factor into this? In this study, I investigated how active
89 researchers experience the impact of competitive funding on their research, in a high versus
90 in a low competitive setting.

91

92

93 **Methods**

94

95 **Study design**

96 Initially, I wanted to test the following hypothesis: does competitive research funding
97 increase questionable research practices? This hypothesis was explored in an experimental
98 design via doing group sessions with active researchers in two different countries: one
99 country with a high degree of competition for research funding, and one country with a low
100 degree of competition for research funding. The Netherlands was chosen as the ‘high-
101 competition’ country (with grant success rates of 20-30%), and Switzerland as representative
102 of a relatively ‘low-competition’ country (grant success rate 50-60%) (according to the Swiss
103 Science Council and the Rathenau institute, personal communication). In addition, I also
104 compared across different disciplines (natural sciences, medical sciences) and ‘seniorities’ in
105 career stage – the idea being that juniors might be under higher pressure. Before performing
106 the group sessions, I also conducted a couple of ‘pilot’ single interviews to gain a better
107 understanding of what are the issues at hand and to help shape the group sessions.

108

109 **Insights from (pilot) single interviews**

110 From the first couple of these pilot single interviews, mostly conducted in Switzerland in
111 2017, it quickly became clear that many researchers did not see a direct connection between
112 competitive research funding and what are called ‘questionable research practices’. This did
113 not mean, however, that my interviewees did not see any questionable effects of competitive
114 research funding on doing good science. My interviewees told me many, and apparently for
115 them quite serious, problems. However, these problems were often of a quite different nature

116 than what is typically being captured under ‘questionable research practices’ in the research
117 integrity literature.

118

119 In addition, it became clear that not all questionable research practices play a role in all
120 disciplines. That this is indeed the case was also recently confirmed in a large-scale survey
121 study, in which humanities scholars attested ‘not applicable’ to a large range of questionable
122 research practices (Gopalakrishna et al., 2022). My interviewees also told me that it can even
123 be the case that what is called a questionable research practice in one discipline can be a
124 virtue in another (see also Ravn & Sørensen, 2021 for a similar finding): for example,
125 diverging from an original research question is a virtue in the humanities but a vice in a
126 medical study. There thus seemed to be a serious problem with the original research design of
127 my study; it seemed to not allow gaining a universal understanding of the effects of
128 competing for research funding on questionable/ responsible research practices.

129

130 Due to the insights gained during these pilot interviews, I decided to shift the original
131 research question in the follow-up group sessions to a more open but rather simple question:
132 “How does competitive research funding affect science (in good or bad ways)?” This
133 question was accompanied by a follow-up question on what could be done better (results will
134 follow in another publication).

135

136 **Participant selection and group session details**

137 The sessions were conducted in 2017 in Switzerland and in 2018 in the Netherlands. In each
138 country, six group session interviews were conducted. The groups consisted of typically 4 or
139 5 researchers, with a minimum of three in one case (natural science senior NL), and a
140 maximum of seven researchers in another case (medical sciences senior CH). These
141 researchers were grouped by scientific domains (natural sciences, medical sciences, and
142 humanities) and career status. Career status was distinguished as ‘junior’ (=temporary
143 employment) or ‘senior’ (=permanent employment)¹. This made a total of twelve group
144 sessions with in total 57 persons. Participants were recruited via personal networks as well as
145 via Dutch and Swiss university websites and the website of the Royal Netherlands Academy
146 of Arts and Sciences.

¹ In the Results, the following abbreviations are being used: med = researcher in a medical field; nat = researcher in a natural science field; hum = researcher in the humanities; jun = junior; sen = senior; NL = researcher currently based in the Netherlands; CH = researcher currently based in Switzerland

147

148 I checked session participants for their experience with funding ahead of the sessions and
149 noticed that the recruitment strategy resulted in a high number of experienced researchers
150 with funding. An overwhelming number of senior researchers had received multiple types of
151 funding in the past (both via national funds, but many also had received EU funding,
152 including an ERC for several participants). Many seniors had additional experience with
153 participating in funding reviewing panels, at both the nationally and the international level,
154 and including for ERC.

155

156 Each session took 3.5 hours. At the beginning of each session and via the invitation email
157 researchers were familiarized with the background of the study (QRP's) as well as with the
158 idea that they could also explore other impacts of competition for funding on science,
159 including in a positive sense. Written informed consent was obtained from all session
160 participants. Researchers in the sessions then made extensive use of a digital tool called
161 "Meetingsphere". This tool is designed to allow anonymized digital interaction between
162 session group members (<https://www.meetingsphere.com>). The tool was chosen due to the
163 sensitive nature of the question, allowing honest answers regarding research integrity
164 problems. At least half of the session time was spent on the following question: 'How does
165 competitive research funding affect science (in good or bad ways)?' Group members were
166 first allowed to type their answers into the digital system. After saturation of commenting
167 (typically after 10-15 minutes), the system was opened for digital commenting (again around
168 10 minutes), followed by extensive oral discussion. One of the groups (Swiss natural science
169 seniors) ended up with oral discussion only due to the delay of one of the session participants.
170 My analysis for this paper focused on the digital session reports only, and the Swiss natural
171 science group (with four participants) was therefore excluded from the specific analysis
172 presented in this paper. My analysis here is thus based on the input of in total eleven group
173 sessions and a total of 53 session participants.

174

175 **Analysis of session reports**

176 I used a grounded thematic analysis in several rounds to analyze the Meetingsphere reports. I
177 cross-checked identified themes in the first round with three other researchers, with analyses
178 largely overlapping. In subsequent rounds, I refined the themes and split some into sub-
179 themes.

180

181 **Results**

182

183 Session participants were prolific in providing comments using the digital tool
184 ‘Meetingsphere’, both with regards to initial own comments and in reaction to others’
185 comments. Via my thematic analysis, I identified a couple of main themes and subthemes that
186 researchers addressed regarding the impact of competitive research funding on science in
187 good or bad ways. Main themes consisted of: (1) The impact on how science is being shaped
188 due to the competition for funding, (2) The impact of grant writing on research time, (3) The
189 impact of publication pressure on detrimental research practices.

190

191

192 **1. Shaping science**

193

194 By far most comments received were within this category (262/ 317). These comments
195 focused on how science is being shaped in practice via funding, and how this influence is
196 being perceived and experienced. Importantly, these impacts are not seen as resulting in
197 essentially wrong or sloppy science. Typically, the impact is experienced due to funder
198 interventions, in both positive and negative ways. However, the negative often outweighs the
199 positive. What typically happens is that researchers do understand and appreciate that funders
200 select projects based on certain features, and that they intentionally shape funding calls and
201 schemes in particular ways (positive). However, funder interventions can have unintended
202 side-effects, and these can then be experienced as problematic by researchers (negative).
203 Below, I provide an overview of the perceived impacts in subthemes. While some subthemes
204 present positive and negative effects in a more balanced way, others show that the effects are
205 predominantly experienced as negative. I also provide the number of comments within each
206 subtheme, to give a sense of how much attention there was for each of the subthemes.

207

208 **Impact on science via peer review**

209 (61 comments)

210

211 There were many comments on how funder peer review impacts science. Many researchers
212 stated that competitive research funding should in theory increase overall quality in science

213 by selecting the best proposals and scientists. Some Swiss researchers also thought this is
214 indeed the case in practice.

215

216 *funding is brought to the best research ideas and best people* (nat jun, CH)

217

218 One Dutch researcher commented upon that success in funding acquisition often means
219 future successes in gaining funding as well. This researcher was neutral about the effects on
220 science via such a process: *I do not know whether it's good or not.* (hum jun, NL).

221

222 There were a few comments on the positive effects of the competition on research practice.

223 For example, one Swiss medical senior scientist said that *it improves research quality.*

224 Researchers across countries and disciplines also expressed that projects that are submitted to
225 funders typically have been thought through and tend to have solid methodologies. The
226 feedback of reviewers can additionally help to improve the research, two Dutch natural senior
227 scientists thought.

228

229 However, other – in particular Dutch - researchers perceived that while this is how it should
230 work in theory the practice looks different. One important problem is that peer-review highly
231 depends on the reviewers and the committee/ panel, and that these can be biased. Many told
232 us that their comments were based on personal experiences, and negative experiences with
233 biases in peer review led some Dutch senior researchers to state that peer review does not
234 work anymore.

235

236 Humanities scholars (in both countries) thought that there is a deep problem because
237 reviewers and panels can be biased if they represent certain research schools or fields. Such
238 biases can even lead to a competition between scientific disciplines:

239

240 *how to avoid that competition between projects turns into competition between disciplines?*

241 (hum sen, CH)

242

243 In the Netherlands, there was a specific problem with clustering of social sciences and
244 humanities into one program. Due to disciplinary differences of what good research might
245 mean several humanities scholars felt they had less chances to gain funding. One humanities
246 researcher said that one would really need to address the question what science really is. The

247 same type of bias was thought to play a role in gaining funding for medical qualitative
248 research (where methods are different than in mainstream medical research).

249

250 *in the combined humanities & social-science boards, there is no understanding of what a*
251 *humanities research project may look like. (hum sen, NL)*

252

253 On the positive side, one medical senior scientist expressed the view that an alternative
254 system to the competitive research funding system might either not exist or be worse. In
255 addition, several younger and older Swiss and Dutch humanities researchers mentioned that
256 funding/ peer review can also enable to escape a limited home environment.

257

258 *Young researchers have the chance to free themselves from their home institutions by*
259 *applying for funding and thus gain access to other cultures, ways of doing science. (hum jun,*
260 *CH)*

261

262

263 **Impact on novel and risky science**

264 (61 comments)

265

266 Researchers submitted many comments on this topic, across all 11 groups. The comments
267 were predominantly negative. Many expressed that while funders often aim to fund
268 innovative and risky projects, the opposite typically happens in practice. One Dutch
269 researcher commented that the '*rhetoric of innovation and breakthrough*' does not reflect
270 how most funding is awarded in practice (hum jun, NL). The reason for this is that research
271 projects are designed to be funded, not designed towards what would be considered 'the best
272 science', new and original science.

273

274 *in principle, good effort to support the best science, but the measures of success are in favour*
275 *of "productive" science, not necessarily creative science (med sen, CH)*

276

277 *the competitive system only works for ideas and methodologies that are well established, well*
278 *known, not for ideas and methodologies that are new and really original (hum sen, NL)*

279

280 One reason for this is that funders put too much emphasis on the track record of the
281 researcher, meaning that one dares not to stray away too far from own disciplinary grounds
282 and instead “plays safe”. It “*encourages researchers to take small steps in the development of*
283 *research ideas instead of taking a larger risk and trying something completely different*”
284 (med jun, CH). It imposes a “*disciplinary straightjacket*” (hum sen, CH) to the individual
285 researcher, it encourages researchers to “*remain within areas in which you have already*
286 *proven yourself with publications*” (hum sen, CH).

287

288 “*Changing fields is discouraged in the current structure of competitive funding, a*
289 *characteristic that is not supportive of interdisciplinarity and innovation.*” (med jun, CH)

290

291 For science, this means that research will progress only in “*incremental steps*” (med jun,
292 NL), while this may not be the best research: “*it probably leads to conservative research*”
293 (hum jun, NL). And this might in the end be counterproductive to what good science should
294 be all about: taking risks, venturing into the unknown.

295

296

297 **Impact on science via funder research agenda**

298 (40 comments)

299

300 Many researchers across countries experienced that funders steer what kinds of research can
301 be done; this is on the one hand positive because money can strategically be put into solving
302 important challenges:

303

304 *It enables society and politics to focus scientific research on key societal challenges and*
305 *problems. In this sense, it contributes to societal problem-solving.* (nat jun, NL)

306

307 However, most researchers across countries experienced under agendas as being problematic
308 because they might not foster the best science. Swiss scientists also commented that it would
309 be disastrous if the funder agenda would bias against doing basic research:

310

311 *Negative/comment: It would be disastrous if competitive funding schemes would push*
312 *research away from fundamental science* (nat jun, CH)

313

314 Indeed, many senior Dutch natural scientists experienced just that, even though some also
315 saw positive aspects in more applied ways of doing science.

316

317 *Negative: nearly all 100% fundamental project funding possibilities in NL are being*
318 *eliminated. Even the Science Agenda is now funded with contributions from industry. (nat*
319 *sen, NL)*

320

321 The same concerns held true for other types of valorization in the Netherlands: valorisation
322 can take time away from doing core research work. Funder bias can also mean that bigger
323 research fields or those with a higher applicability are more likely funded, which both natural
324 and medical scientists across countries experienced as problematic.

325

326

327 **Impact on science via incentivizing collaborations**

328 (29 comments)

329

330 Researchers frequently reported that funding has effects on collaborations. It typically fosters
331 to collaborate, and many researchers regarded this in principle as positive. For example, one
332 Dutch medical senior perceived this as good because *it helps to establish interactions and*
333 *networks beyond the finally funded projects.* Another medical Swiss senior expressed that *the*
334 *process of writing applications already has major impact on creating innovative idea and*
335 *collaborations.*

336

337 However, many researchers also experienced that those collaborations often do not work well
338 in research practice. This can be due to a variety of reasons, such as too large consortia, inter-
339 disciplinary problems or feeling forced to collaborate. This can be problematic to a degree
340 that collaborations have negative effects in practice. Often medical seniors uttered such
341 skepticism about large consortia/ interdisciplinary multicenter collaborations. They in
342 practice do not work well, they said, there are communications problems between disciplines,
343 and they would *need better support and guidance* (med sen, CH). They can be forced upon
344 you, and lead to a lot of *formal interaction without actual benefits* (nat jun, CH). In terms of
345 certain collaborations, you could better do without in practice.

346

347 *forming strong consortia to increase chances; this can also be a disadvantage if you feel*
348 *obliged to cooperate with groups for increasing chances on funding, but that will either just*
349 *complicate the research process / feasibility or even be a disadvantage* (med sen, NL)

350

351 Such sobering practices can lead to dishonesty about collaborations in applications. One
352 senior Swiss humanities researcher wrote that they often exist only on paper, are fake.
353 Funding can also lead to confusing effects with regards to collaborations and team science,
354 for example in the humanities which does not have a tradition of ‘team research’.

355

356

357 **Impact on science via research planning**

358 (20 comments)

359

360 Many researchers across groups expressed that applying for funding has a positive effect on
361 thinking through, planning and structuring research. This can make researchers *think about*
362 *next steps in your research* (med sen, NL) and *think carefully about* what to do and how to do
363 it. Ultimately, this *might help to make [the research] more effective and more fruitful* (both
364 hum jun, NL).

365

366 Some Dutch natural scientists also expressed that the need to apply for funding could even
367 help to come up with new ideas and trigger new collaborations, for example with other
368 groups with better skills. It can in practice also enable the researcher to spend time on
369 thinking and getting up to date with the literature. However, Dutch medical senior researchers
370 also perceived that the way good science should be done often is at odds with the way
371 funding works:

372

373 *It also limits flexibility to change the design when needed or address additional question*
374 *which appear more interesting on the way.* (med sen, NL)

375

376 One Dutch natural science researcher thought this is not so much of a problem in practice,
377 because “*surely no one does exactly what is in the grant, right? You write a cool proposal*
378 *and decide later what's actually possible*” (nat jun, NL). Other researchers did feel forced to
379 become dishonest in their grant-writing in order to circumvent this epistemic problem:

380

381 *Bad: Science is per definition not predictable. Competitive funding forces you to predict your*
382 *science, i.e. first do experiments than write the grant. Afterwards claim success because all*
383 *your 'predictions' turned out to be true. This is often termed 'pilot'-data (med sen, NL)*

384

385 *'You have to have 2/3 of the paper already written to get the grant for the project' (med sen,*
386 *NL)*

387

388

389 **Impact on research via length of funding period**

390 (18 comments)

391

392 Another effect of funding on scientific practices was that grants typically are for shorter
393 periods only – typically a couple of years. Such limitations can restrict the design of a project
394 and lead to a focus on *short term deliverables* (med jun, NL). One Dutch senior natural
395 science researcher experienced this effect as positive, and even thought that having such
396 short-term funding could benefit long-term research lines in the end because the expectation
397 of the release of data and new results stimulates you to work harder.

398

399 However, most researchers, across countries and disciplines, saw the impact of time-limited
400 funding schemes as a potential danger for doing good science. They expressed that *it can be*
401 *difficult to continue a line of research* (nat sen, NL) and that *long term research is being*
402 *prevented* (nat sen, NL). The latter is a problem because *big societal problems require long*
403 *term data* (nat sen, NL). It was obvious that many researchers considered research done over
404 a long time as highly valuable but endangered by funding practices. In the humanities, some
405 scholars feared short periods of time would not even allow to do any significant research at
406 all. One compared short-term research in the humanities with building *pre-fab houses, but no*
407 *cathedrals* (hum sen, NL)

408

409 *Most competitive research funding is project based and 3-4-5 years duration. It is highly*
410 *questionable whether this system adequately supports academic research in the humanities*
411 *since this research often takes much longer period of times to mature.* (hum jun, NL)

412

413 Several senior researchers also reported short-term funding as leading to hectic research due
414 to the time pressure, sometimes even leaving some of the gathered data to be un-analysed in
415 the end.

416

417

418 **Impact on science via strategic grant applications**

419 (18 comments)

420

421 Many researchers across countries, seniorities and disciplines mentioned that researchers
422 strategically tailor their research ideas, topics, design and methods to what they think will
423 likely receive funding. This can mean submitting to funder ideas and programs at the expense
424 of own interest and ideas, which can imply impoverishment of science:

425

426 *Research projects are designed to be funded what might be different to research projects with*
427 *very innovative and “unusual” ideas (med jun, CH)*

428

429 It can also mean tailoring research to fit into funder requirements and previously successful
430 templates or restricting design of a project to the specific guidelines set out by the funder.

431 One researcher puts very clearly that *The first question a researcher will always ask*
432 *him/herself when writing a grant proposal is: "What is the right strategy to get the grant?"*

433 (nat jun, CH). Such fitting of research to funding requirements can then be followed up in
434 reality (or not). As a result, one researcher feared decreasing diversity in science:

435

436 *It makes everyone jump through the same hoops, everyone has to meet roughly the same*
437 *criteria. In this sense it works against diversity in the Dutch science system. (nat jun, NL)*

438

439 It can also mean strategically generating income, part of which will be used to fund the ‘real’
440 research of interest:

441

442 *sometimes large research proposals may be written to generate income, only a small fraction*
443 *of which (the spoils) are used to fund basic research that the principal investigators are*
444 *actually interested in (med jun, NL)*

445

446

447 **Impact on science by feeling the need to write a ‘sexy’ proposal**

448 (15 comments)

449

450 Across countries, seniorities and disciplines, researchers experienced that supposedly sexy,
451 fashionable, topics and research proposals are more likely to be funded:

452

453 *Funding calls for 'sexy projects'* (med jun, CH)

454

455 However, researchers did not think that these kinds of projects are typically of high scientific
456 value because it does not focus on good science. And though it can also have positive effects
457 of building trends, it can also have the problematic side effect to reduce diversity in scientific
458 topics, disciplines, methods:

459

460 *skew/select specific trends, and then everyone jumps on the bandwagon - positive effect is*
461 *that this can rapidly accelerate a promising direction, negative effect is that it creates*
462 *bubbles/echo chambers which suck funding away from other directions (since the ultimate*
463 *pool of money is not infinitely increasing.* (nat jun, CH)

464

465

466 **2. Impact of grant-writing on research time**

467 (28 comments)

468

469 Another theme expressed by junior and senior Dutch, and junior Swiss, researchers in all
470 fields was that the constant need to apply (or act as reviewer) for funding is extremely time-
471 intensive and distracts from time spend on and care for ongoing research. For junior
472 researchers, this can mean spending a considerable amount of time during a given project on
473 writing an application for the next one. This means that one cannot invest sufficiently in the
474 project one is currently undertaking. And senior researchers, many comments claimed, often
475 do *more* grant-writing or grant-evaluating than research. This problem is particularly severe if
476 funding rates are low:

477

478 *Takes up a lot of time and effort that basically goes to waste if the project is not funded -*
479 *problem especially when, as is the case with NWO, the chances of getting funding are so low.*
480 *(bad thing)* (hum sen, NL)

481

482 Some Dutch junior humanities scholars actually doubted the overall value of such a funding
483 system - due to the time investments that currently need to be made. Also the associated
484 administration costs are thought to be too time intensive by some Swiss researchers, and they
485 said that this time could better be used to do research.

486

487 There were only a handful positive effects of funding on time management being reported.

488 These comments were exclusively brought forward by senior natural science and senior

489 medical researchers across countries. One Swiss medical researcher for example thought that

490 *competitiveness can trigger[s] an environment that stimulates the investment of effort (time,*

491 *thought, hard work)*. One Dutch senior natural scientist thought that the need to devote some

492 time towards writing grants can provide you with time to do some creative thinking.

493

494

495 **3. The impact of publication pressure on detrimental research practices**

496

497 There were comparatively few comments provided within this theme, a mere 9% of all

498 comments. Below, I distinguish between comments mentioning questionable research

499 practices and sloppy science (5%), and those stating scientific malpractices (3,5%).

500

501 **Impact on questionable research practices and sloppy science**

502 (16 comments)

503

504 There were some remarks on the occurrence of questionable research practices. Interestingly,

505 statements regarding negative effects through publication pressure were made mostly by

506 junior Swiss researchers in the natural sciences and the humanities, though there was one

507 statement by a young Dutch humanities scholar as well. This finding stands in contrast to the

508 hypothesis that researchers in a country with a higher funding rate (and thus supposedly less

509 competition) should put a more relaxed focus on publications.

510

511 Junior researchers expressed for example the view that the following questionable publication

512 practices are taking place due to the publication pressure: *splitting research into minimal*

513 *publishable pieces, self-plagiarism, hasty and not fully careful analyses, etc.* (hum jun, NL).

514 Another researcher thinks that *junior researchers may be tempted to write papers with*

515 *controversial views* (hum jun, CH), or submit to *exaggerating impact both in proposal and in*
516 *publications (overhyping)* (nat jun, CH).

517

518 Several Swiss natural science and humanities juniors emphasized that publication pressure
519 could result in haste versus care. Interestingly, junior researchers then assumed that this is
520 predominately problematic for reviewers who might need to put a lot of effort and time into
521 correcting this. At least some researchers thus apparently thought that sloppy research would
522 eventually get corrected via journal peer reviewing.

523

524 One researcher mentioned that publication pressures are not primarily exerted by the funding
525 system but rather by the academic career system:

526

527 *In my opinion this [rapid publication versus careful analysis] is a problem related to extreme*
528 *weight given to publication record when academics apply for positions.* (nat hun, CH)

529

530 On the other hand, several – mostly senior – medical and natural sciences researchers across
531 countries expressed that the publication pressure which the system exerts can also be positive
532 because it ensures that papers are eventually being published.

533

534

535 **Impact on research misconduct**

536 (11 comments)

537

538 Only four of the in total 53 interviewees commented that competition for funding could result
539 in research misconduct, three of which were either Swiss or Dutch medical senior scientists.

540 One of the Swiss ones for example said that *the high pressure for success obviously fosters*
541 *the danger of data fabrication, which is extremely difficult to control* (med sen, CH). The

542 reasons for fringe behaviour, another Swiss said, may be extreme competition amongst PI's.

543

544 However, the Dutch medical scientist commented that if bad practices indeed occur, the
545 problem may have to be viewed in a much broader perspective than funding per se. One
546 would need to consider also "*researcher's careers, positions, salaries etc*". Because these
547 aspects are based on the same criteria. Interestingly, the same scientist also admitted that
548 occurrence of bad practices in his/her case were mainly based on hearsay and not on own

549 experiences. They were thus essentially speculations. It is then interesting to note that the
550 fourth person mentioning a potential occurrence of severe research misconduct formulated
551 the comment as a question:

552

553 *if your livelihood depends on it, doesn't it seem very understandable to tweak the results of*
554 *your study so to increase the chance of that high impact paper that will help you get your*
555 *next funding?? (nat sci jun, NL)*

556

557 In this group, the four other junior Dutch natural scientists all individually reacted to such an
558 (in their eyes) extreme view of unethical behaviour, even though they admitted that scientists
559 may behave in strategic ways and thus do things too sloppy or somewhat biased.

560

561 *I think "cheaters" is maybe a bit too strong. I would say that the funding system stimulates*
562 *"strategic behaviour", i.e. behaviour to maximize the quantifiable output of research. (nat sci*
563 *jun, NL)*

564

565

566 **Discussion:**

567

568 Researchers involved in my study experienced that competition for funding has a drastic
569 effect on scientific practice. While some of these effects are positive, most effects are
570 perceived as problematic. Those problematic effects, however, were of a quite different
571 nature than what typically is perceived as questionable research practices (QRP's) in the
572 research integrity literature. According to session participants, competitive research funding
573 did not have a big impact on detrimental scientific practices (a mere 9% of the comments
574 provided). Publication pressure was experienced more as a general phenomenon in academia.
575 Contrary to expectations, it was junior researchers in the *low*-competition country which at all
576 connected funding with publication pressures.

577

578 The effects on science which researchers perceived as most important (91% of comments)
579 were direct effects on science introduced by funding. Most of these effects were expressed by
580 all session groups. Such effects were typically of a much broader nature than performing
581 single publications or studies in a correct manner. The underlying mechanism seems to be the

582 following one: funders aim to incentivize researchers to do good science. For example, by
583 asking for explicit proposals they should select and provide money for the best science.
584 Researchers are also being pushed to valorise, to broaden their perspective by collaborating in
585 bigger teams, or to show that their projects are feasible. And while researchers do appreciate
586 and value these intentions, they often feel that they have questionable unintended side effects
587 in practice. Selection via peer review can have questionable effects of decreasing diversity.
588 Feasibility often results in non-risky predictive research. Valorisation bends away from
589 putting sufficient care into the core research. Working in teams can turn out to be extremely
590 difficult and diminish individual researcher maturation. I would suggest that many of such
591 intended and unintended aspects fell under the umbrella of the ‘projectification’ of science
592 induced by funding (see also Felt, 2021a). Via shaping science into ‘projects’, funding has
593 unintended side effects of at least some science to become predictable, boring, short-sighted,
594 fashionable and/or overpromising. Researchers worried that this might make it difficult to do
595 good science that really matters: plunging into the unknown or addressing big issues that
596 would need a long-term horizon to mature.

597

598 High competition for funding in the Netherlands seems to have exacerbated such unintended
599 effects of funding in an interaction effect (but not QRP’s). The Netherlands does not only
600 have a more competitive funding system, but is also steered by science policy to a much
601 higher degree than Switzerland, with researchers experiencing less autonomy (Lepori et al.,
602 2007), for example also with regards to valorisation (de Jong et al., 2016). This effect was
603 visible in my findings: Dutch researchers were more vocal and experienced with negative
604 side effects of strong science policies, such as little budget for basic science or aspects of
605 valorisation. And I speculate that those effects overshadowed any effects of publication
606 pressure with regards to the Netherlands (which is why I might have found a higher
607 perception of publication pressure amongst Swiss junior scientists than Dutch ones). Swiss
608 scientists seemed in comparison much happier with their funding system, and this went
609 beyond pure aspects of lower competition (higher autonomy).

610

611 When looking at the scholarly literature beyond research integrity, none of my above findings
612 on how funding shapes science is very novel or surprising. Scientists have over the years
613 repeatedly pointed out that competing for funding impacts science in for them often worrying
614 ways (starting as early as in the 1970s, see e.g. Brooks, 1978). There are a whole host of
615 science policy and other studies addressing and discussing the relationship between details of

616 competitive research funding and scientific practice. Topics include for example funder peer
617 review and its biases (Bornmann & Daniel, 2006; Langfeldt, 2006; van den Besselaar &
618 Leydesdorff, 2009), valorisation (Wallace & Rafols, 2015; de Jong et al., 2016), and risky
619 versus conservative science (Guthrie et al., 2019; Veugelers et al., 2019; Ayoubi et al., 2021).
620 More recently, some studies have started making a connection between this literature and the
621 research integrity literature (Conix et al., 2021; Recio-Saucedo et al., 2022).

622

623 My study is novel in exploring the effects of competitive research funding bottom-up,
624 showing that the current focus on QRP's might misrepresent where actual problems with
625 doing good science in connection with funding lie. Other studies of a comparable
626 ethnographic kind have made similar findings with regards to what it would mean to do good
627 science and what currently restricts it (Jerak-Zuiderent et al., 2021), also with regards to the
628 impact of time and projectification (Felt 2021 a,b). But are the insights generated by my
629 study still about research integrity per se? Hasn't it in the end become, as above studies seem
630 to suggest, more about science policy? Shouldn't we rather strive for a more explicit
631 demarcation of what research integrity actually is (Helgesson & Bülow, 2021)? However,
632 other research integrity researchers also already emphasize that there needs to be a shift in
633 focus from individual researcher responsibilities to aspects of the 'system' (Bonn & Pinxten,
634 2019; Bruton et al., 2020; Sørensen et al., 2021). In addition, what is currently understood
635 under research integrity seems to depend already on whom you ask (Davies, 2019; Davies &
636 Lindvig, 2021).

637

638 I would suggest that our goal in connection with funding should be to find out what the real
639 problems on doing good and valuable science are – and ultimately, what issues funders and
640 other science policy makers should address to improve the situation. Looking at this from
641 several perspectives is certainly valuable. My findings are very different from the ones
642 reached by Labib et al. (2021) and Roje et al. (2021), and also my recommendations would
643 be different: Funders should reflexively re-evaluate some of the specifics of their funding
644 schemes. And shouldn't our main concern be about how we enable researchers to do good
645 science?

646

647

648

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650

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661

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