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Returns of research funding are maximised in media visibility for excellent institutes

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This paper investigates public communication activity across research institutes with varying levels of excellence in research, and how competitive funding affects this activity. With competing funding trends requiring plans for public engagement in the funded research, a question arising is whether institutes capturing higher amounts of funding return the most value for public communication. Using international data from $N = 1550$ institutes in six countries, we first compare public communication activity among excellent and less-than-excellent institutes. We then investigate the relationship between competitive funding and public communication across levels of excellence. We find that the returns of funding are maximised in media interactions in excellent institutes when compared to the less excellent, but not in public events. This suggests that returns of research funding may not result in the expected outcomes for increased 'public engagement in science' if institutions are guided by instrumental goals.

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Main

Public communication of science has increasingly become crucial to research activity. There is evidence that scientists and research institutions around the world are embracing this practice, and allocate resources and time to it (e.g. Bentley and Kyvik, 2011; Entradas et al., 2020). One important driver of this tendency, it is often assumed, is that of the current funding trends that require 'impact on society', that is, not only that the funded research is communicated to the public, but also that it is relevant to citizens and they engage with it (EC, 2013; Holbrook, 2010, 2012; Kamenetzky, 2013). The expectation from funders is that institutions and individual scientists receiving public money communicate with broad audiences and efforts go into public communication. Yet, the effects of competitive funding on public communication activity have so far been overlooked. In this context, and of particular importance for the public understanding of science, is how *excellence in research* relates to institutional public communication. Although studies that have focused on scientists show that those more academically productive are also more likely to engage in public communication (e.g. Bentley and Kyvik, 2011; Martinez-Conde, 2016; Entradas and Bauer, 2019), less is known about how this relationship plays at the institute-level. With current funding being rated on 'research excellence' with the 'best' institutions getting most funding, it would be reasonable to ask whether excellent institutes engage more in public communication of research, and whether increased funding brings returns to public communication or if there are barriers to greater involvement in research-intensive institutes.

There could be many reasons for expecting increased activity among excellence institutes. Among others, it could be simply because they attract more funding, and the efforts could be prompted by requirements of the funded research. We know from previous work that often the more prestigious institutions attract the top research grants (Katz and Matter, 2017; Murray et al. 2016), and also that funding inequalities are increasingly considerable (Bloch and Sørensen, 2015; Larivière et al., 2010; Mongeon et al., 2016), with larger amounts often distributed based on a Matthew Effect (Merton, 1968) by rewarding those already capturing the larger budgets (Katz and Matter, 2017; Murray et al. 2016). It would then not be surprising to find higher public communication among more research-intensive institutes.

Yet, there might be constraints in research-intensive institutions that challenge the expected relationship. For instance, organisational views that public communication is less important than research (e.g. Ecklund et al., 2012), and the current evaluation and rewarding of research and researchers that include for example incentives to publish in top journals (Bouter, 2015; Tijdink et al., 2021). This may be particularly visible in institutions aspiring to be, or that already are, part of the 'world leading' rankings, the 'excellent institutions', where research output is assessed but public communication is not. Those institutions may discourage researchers to engage in the activity by not supporting or allowing time for it as it might compete with research activity. Indeed, lack of time and institutional support have often been reported by scientists as the main barriers hampering participation in outreach (e.g. Royal Society, 2006; Wellcome Trust, 2015; Kassab, 2019). At the same time, the participation of researchers is one of the most important contributors to the overall communication activity of a research institute (Entradas et al., 2020). That is, outreach could be understood as a competitor to research output (Martin, 2011; Martinez-Conde, 2016), particularly among research-intensive institutions where there is more competition among peers.

We should note that competing arguments can be put forward in favour and against current funding distribution and that it is not our aim to discuss the relative merits of current evaluation and funding practices. If on the one hand, it can be indicative that the system is working as intended—i.e., excellence is being rewarded with supplementary funding, on the other, criticisms have emerged regarding the criteria for excellence (Martin, 2011), diminishing returns of funding concentration (Mongeon et al., 2016), and possible gamification of indicators (Grupp and Mogee, 2004). Here we use rankings of excellence as a proxy indicator of research intensity to distinguish those more research-intensive institutes from less research-intensive ones. One could argue that those more excellent institutes are also those doing more research (Hicks, 2012; Hicks and Katz, 2011; Katz and Matter, 2017), yet, might not necessarily be the most productive (Martin, 2011; Katz and Matter, 2017). As such, it is not because we consider this to be the best way to distribute funding, but because it is the current evaluation system used in the countries surveyed in this study and thus, the most appropriate to analyse the questions at stake. We examine excellent and less-than-excellent institutes separately and consider research funding, as reported by institutions, as a distinct variable to be able to examine its effects isolated on institutions with different levels of research intensity, i.e., excellent and less-excellent institutes. Against this background, two main research questions drive this study:

(RQ1) Does the level of public communication vary between institutes with differing levels of research excellence?

(RQ2) How does research funding affect public communication in excellent and less excellent institutions, when considering the organisational and contextual factors where institutes operate? This is the same as to ask whether research funding brings added value to communication in research-intensive institutions.

To address these research questions, we build on a previous framework (Entradas et al., 2020) that conceptualises institutional public communication as a function of context factors (C factors) and public communication disposition factors (D factors) that are likely to influence communication activity (e.g. Kreimer et al., 2011; Bentley and Kyvik, 2011; Mejlgaard et al., 2019, Entradas and Bauer, 2017). C factors relate to the environment in which an institution is embedded; these include features of the organisation and its context, such as research area, size, country, and size of their research budget. D factors refer to the commitment to public communication, as seen by communication infrastructures in place including communications staff employed, funding allocated, adoption of guidelines/policies for public engagement, and the level of participation of researchers in outreach ('active researchers' hereafter). As such, in our regression models, we consider the effects of these factors on public communication both in excellent and less excellent institutes, and the effects of funding alone, when also controlling for these factors. We examine the effects of the relationships for *public events, traditional media* and *new media channels* (three dependent variables) as they are distinguished in form and require different effort and resources from institutions.

Methods

Procedure. For RQ1, we run ANOVAs for each of our three dependent variables—public events, traditional media channels, and new media channels, for excellent and less excellent institutes. For RQ2, we run hierarchical linear regressions for each dependent variable, using IBM SPSS 26. For the hierarchical regressions, we employed a stepwise method, in which all controls were entered in Step 1; in Step 2, we added research funding—the main variable of interest. Separate regressions were conducted for excellent and less excellent institutes, to allow for comparison of the relative effect of research funding on each type of institution. For the complete models (Step 2), *z*-tests were conducted using the Stats Tools Package macro (Gaskin, 2016) to test for significant differences in regression coefficients across levels of excellence.

Data. In this study, we use data from six countries ($N = 1550$) including Germany ($N = 355$), the United Kingdom ($N = 172$), Italy ($N = 351$), Portugal ($N = 208$), Brazil ($N = 149$), and Japan ($N = 315$), about research institutes' public communication practices. The data are from the international project MORE-PE (Mobilisation of Resources for Public Engagement, 2016–2020) coordinated by the first author. The quantitative data were collected in 2018[1], in the national languages; one questionnaire was collected per institute and completed by the unit's directors or public communication staff.

The data are representative of the 'research institute system' in the surveyed countries: We used entire populations of research institutes in smaller countries, and probability samples of institutes in larger countries, stratified by areas of research (OECD, 2015) (Table S1). All strata were equally represented in the sampling frames ($N = 200$ institutes per area of research, per country) so that results would not be biased towards fields engaging more in public communication. The study has a 25% response rate, which is in line with what is expected for online-based surveys, and is considered good when the sampling units are organisations rather than individuals (Sheehan, 2001; Shih and Fan, 2008) (see Entradas et al., 2020, for a detailed description of methods, including sample design, data collection, and national samples).

Dependent variables

Indices of intensity. Indices of intensity were built from lists of public events (nine types of public events ranging from public lectures to open days, science cafes/debates, public exhibitions, science festivals/fairs, science cafes/debates, policy-making events workshops with private organisations, talks at schools, and citizen science projects), traditional news media (thirteen traditional news channels such as interviews to newspapers, radio and TV, other TV, articles in magazines press releases, press conferences, newsletters, brochures/non-academic publications, multimedia, popular books, policy briefs, materials for schools), and new media channels (six new media channels such as Facebook, Twitter, unit's website, blogs, Youtube, and Podcasts). For each channel, respondents were asked about the frequency of use on a scale from "never (1)", "annually (once a year) (2)", "quarterly (2–6 times)", (3) "monthly (7–20 times a year)" (4), "weekly (>20 times a year) (=5); a "don't know" option was also provided (6); social media included the option "daily (>40 times a year)" and excluded the option "once a year" (Table S2). For the ANOVA analyses, the indices of intensity were built from the sum of the estimated number of activities within each communication type—three dependent variables. For events and traditional channels, variables were coded as follows: never was recoded (0), annually was recoded (1), quarterly 4 was recoded (4), monthly was recoded (12), and weekly was recoded (48; referring to the number of work weeks per year); for each social media channel the recoding was 0 for (never), 4 (quarterly), 12 (monthly), 48 (weekly), and 40 (daily). That is, for each institute we are estimating the total participation in events, traditional channels, and social media. This allows us to report the data more meaningfully. Reliability analysis shows high internal consistency between the items (Cronbach's Alpha = 0.76 for public events, 0.86 for traditional media and 0.78 for social media).

For the analyses of drivers of activity, data were analysed using continuous variables, the factor scores resulting from confirmatory factor analysis (CFA) (see Table S3). The fits for the model used show a very good fit ($\chi^2 = 627.54$, CFI = 0.96, RMSEA = 0.04, TLI = 0.95, BIC = 56,474.49, df = 142, $p < 0.001$). Higher scores correspond to higher activity (full description of the CFA model can be found in Entradas et al., 2020).

Independent variables

Excellence in research. Level of excellence is a binary variable coded (1) for excellent, and coded (0) for less excellent. Because we are investigating research institutes (and not universities), we used national evaluations of research units as a measure of *excellence in research* and classified institutes in 'excellent' (versus less-than-excellent institutes) according to such national evaluations. Since NPM reforms in OECD countries in the financing of higher education institutions in the 1980s, institutions' research budgets have been attributed on highly competitive national schemes on the basis of excellence in research (Hicks, 2012) which follow international standards, often evaluated by external, international panels of experts (both for project funding, which is increasingly becoming the highest part of institutes' income and for basic funding). We consider a national ranking a better indicator of excellence than an international ranking as they evaluate institutions in the national contexts in which they are embedded and work. Perhaps, most importantly, international rankings do not consider research institutes—our unit of analysis—but the university as a whole, and therefore produce an indirect (unreliable) indicator of excellence at our level of investigation; there might be institutes within universities in the top rankings that are not excellent; the opposite might also be true.

Lists of excellence that classify institutes into levels of research excellence were provided by national government sources. For Italian units: units were classified according to Ministry of Education, University and Research (MIUR) and ANVUR (National Agency for the Evaluation of Universities and Research) lists of best Italian Departments and Research Institutes; the UK used the Research Excellence Framework (2015); for Portuguese units, we used the Foundation for Science and Technology (FCT) lists of excellence of research units (2014); in Brazil, the excellence classification was based on the Ranking Universitário Folha de Sao Paulo (RUF) (2016); for German institutes, we used the "Excellence Initiative" by the German Research Association (DFG) (2017); and in Japan, we used the excellence lists by National Institute of Science and Technology Policy (NISTEP) (2016). The concept of excellence used here is not to be confused with the Excellence theory extensively used in PR studies that examine how, why, and to what extent the communication of an organisation affects the achievement of its objectives (Grunig and Grunig, 2008). We are using the concept as an indicator of research activity. Table S4 reports the number of excellent and less excellent institutions for each country.

Context variables (C variables). Context variables *country*, *area of research* and *size*, were used as controls. Country consists of six dichotomous variables. The reference group is 'Japan' (the lowest level of activity). The area of research consists of six dichotomous variables representing OECD's classification schema for fields of science (OECD, 2015). The reference group is the 'Humanities'. Size measures the number of researchers working at the institute and was coded ordinally as (1) (less than 20 researchers), (2) (between 20–40 researchers), (3) between 41–60 researchers, and (4) (more than 60 researchers).

Research funding refers to the average amount of research funding in the last 3 years (previous to the survey), as reported by institutes. We use it as an indicator of competitive funding. Research funding is a categorical variable measured at the ordinal level: (1) <€250,000 euros, (2) between €250,000 and 500,000; (3) between €500,000 and €1M, and (4) more than €1M.

Communication disposition variables (D variables). *Communications staff*, is a count variable indicating the number of staff employed for communications tasks; *communications funding* indicates the percentage of the institute's annual budget allocated

to public communications; this variable was ordinally coded as (=1) (none), (2) (<1%), (3) (1–5%), (4) (5–10%), and (5) (>10%); *public communications policy* is a dummy variable coded as (1) if the institution has a policy, and (0) if otherwise; and 'active researchers' engaging in outreach is an ordinal coded variable which indicates the percentage of researchers who engage in public communication activities at the institute; this variable is coded as (1) none; (2) <10%; (3) between 10–20%; (4) between 20–40%; (5) between 40–60%; (6) 60–100%. For normalisation purposes, in the analysis, the mid-point for each represented range was employed in lieu of the numerical value of the category. Table S1 shows descriptive statistics for the independent variables.

Results

Research Question 1

Increased activity among excellent institutes. Firstly, it is important to note that both excellent and less-than-excellent institutes engage in various types of public communication activities including public events, traditional media, and new media channels to communicate about their research. Yet, the *F-ratio* indicated significant variation between groups for institutes' participations in public events ($F(1, 1548) = 4.893$, $p < 0.05$), use of traditional media ($F(1, 1548) = 6.288$, $p < 0.05$) and new media channels ($F(1, 1548) = 18.642$, $p < 0.001$) (Table S5). For example, excellent institutes reported an average of 34 public events (versus 30 reported by less excellent; the median is 21 for excellent versus 19 for less excellent), 50 interactions with traditional media (versus 42 in less excellent; median is 29 for excellent versus 21 for less excellent), and 165 online interactions per year (versus 119 in less excellent; median is 60 for excellent and 32 for less excellent) (Fig. 1). Although these analyses provide a good understanding of levels of communication across levels of excellence, they do not control for spurious effects and do not explain why excellent institutes are more likely than others to be more active, which we investigate in RQ2.

Research Question 2. To address research RQ2, we run hierarchical regressions for excellent and less excellent institutions separately. For these regressions, step 1 (Model 1) included control variables (C and D factors) and step 2 (Model 2) added the 'research funding' variable. Table 1 shows the results of the regressions for Models 2, our best explanatory models; the regression tables for both models are included in the SI (Tables S7–S9).

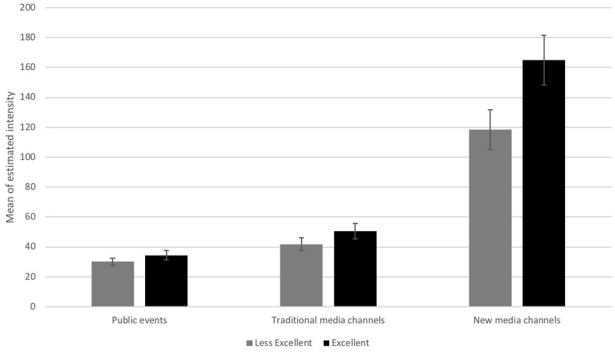

Fig. 1 Frequency of public communication activity compared across level of excellence in research. Estimated average number of public events, traditional media, and new media channels by research institutes, in the 12 months prior to the study ($N = 1550$).

Effect of C factors on excellent and less-than excellent institutes. Models 1 show that C factors are important determinants of public communication activity in both types of institutes. These effects are kept significant in Models 2, showing independent contributions to communication activity. Most science fields exhibit no significant effects, with the exception of Engineering and Technology, for which a negative effect is found for new media both for less excellent and excellent institutions, and also for traditional media but only among excellent institutions. This suggests that institutes within this field are less likely to engage in these types of activities than the baseline category, Humanities, in both types of institutes. Similarly, there are also significant effects for countries. Institutes in Brazil, Italy and the Netherlands show higher activities when compared to institutes in Japan (the baseline category). The differing levels of communication activity by country and discipline are aligned with previous findings (Entradas et al., 2020). and suggest that differences between countries and areas of research exist regardless of the level of excellence of institutes. Size is also an important predictor for all three dependent variables, both for excellent and less excellent institutes, with the exception of new media, which shows no effect.

Results of the *z*-test suggest that there are no differences in most cases in the effects of these factors on excellent and less excellent institutes, meaning that these variables are equally important for communications at both types of institutes (*z*-test coefficients were not significant); the exception is for excellent institutes in Italy that organise more public events ($b = 0.819$, $p < 0.001$) than less excellent ones ($b = 0.476$, $p < 0.001$).

Effect of D factors on excellent versus less than-excellent institutes. Similarly, both Models 1 and 2, show important contributions from communication disposition variables (D) for the three dependent variables. By decreasing order of importance, these are: the presence of a communications policy, the percentage of active researchers participating in outreach, and having communication staff and funding. Furthermore, these variables, as indicated by the *z*-tests that do not point to significant differences, make similar important contributions in excellent and less excellent institutions, suggesting that communication infrastructures are important, regardless of institutional excellence ranking.

Effect of research funding on excellent versus less-than-excellent institutes. Adding research funding to the models (Models 2) increases the models fit for all three dependent variables in both types of institutes and accounting for C and D variables. This increase in fit is especially prominent in excellent institutes, where funding shows a stronger effect. Models 2 overall explain between 30% and 40% of the variance in public communication activity in both types of institutes (see Tables S7–S9).

Research funding is positively associated with all three dependent variables, public events, traditional media, and new media, with higher sizes of research funding associating with higher public communication activity (Table 1). These effects are stronger for media channels—both traditional and new media—than for public events. For instance, funding accounts for 5.7% of explained variance of traditional media in excellent institutions compared to 1.8% in less-than-excellent institutions, and for new media research funding alone accounts for 6.4% of variance explained, versus 1.4% in less-than-excellent institutions.

It is interesting to note also, that the effects of D variables increase slightly in Models 2. This increase is more evident for 'active researchers', suggesting a relationship with funding, i.e. that funding might somehow associate with researchers' involvement in public communication. This is especially noted in new

Table 1 Linear regressions for public events, traditional media, and new media intensity, by the level of excellence—Model 2 ($N = 943$).

Variable	Public events		Traditional Media		New media	
	Less excellent	Excellent	Less excellent	Excellent	Less excellent	Excellent
Natural sciences	0.031 (0.117)	0.197 (0.111)	0.004 (0.121)	−0.003 (0.111)	−0.210 (0.114)	−0.087 (0.114)
Engineering and technology	−0.104 (0.119)	−0.101 (0.126)	−0.138 (0.123)	−0.326** (0.126)	−0.310** (0.116)	−0.386** (0.129)
Medical and health sciences	−0.241 (0.134)	−0.015 (0.127)	−0.067 (0.139)	−0.100 (0.128)	−0.243 (0.131)	−0.169 (0.131)
Agricultural sciences	0.195 (0.156)	0.272 (0.232)	0.289 (0.161)	0.170 (0.233)	−0.103 (0.152)	−0.113 (0.238)
Social sciences	−0.143 (0.117)	−0.094 (0.109)	0.001 (0.121)	0.081 (0.109)	−0.168 (0.114)	0.039 (0.112)
Germany	0.283* (0.119)	0.535*** (0.115)	0.115 (0.123)	0.377*** (0.116)	0.143 (0.116)	0.264* (0.118)
Italy	0.476*** (0.115)	0.819*** (0.135)	0.392*** (0.118)	0.626*** (0.136)	0.401*** (0.111)	0.455*** (0.139)
Portugal	−0.116 (0.126)	0.148 (0.137)	−0.318* (0.130)	0.002 (0.138)	−0.087 (0.123)	−0.075 (0.141)
United Kingdom	0.284 (0.185)	0.398*** (0.110)	0.196 (0.190)	0.262* (0.110)	0.869*** (0.180)	0.704*** (0.112)
Brazil	0.888*** (0.190)	0.900*** (0.113)	0.819*** (0.196)	0.823*** (0.113)	0.850*** (0.185)	0.895*** (0.116)
Size	0.001*** (0.000)	0.000*** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)
Communication staff	0.054** (0.017)	0.018* (0.008)	0.047** (0.018)	0.028*** (0.008)	0.043* (0.017)	0.027** (0.009)
Active tesearchers	0.664*** (0.138)	0.527*** (0.133)	0.637*** (0.142)	0.569*** (0.133)	0.471*** (0.134)	0.289* (0.136)
Communication policy	0.320*** (0.077)	0.243*** (0.075)	0.284*** (0.079)	0.245*** (0.075)	0.283*** (0.075)	0.229** (0.077)
Communication funding	0.085* (0.037)	0.121*** (0.037)	0.127*** (0.038)	0.102** (0.038)	0.128*** (0.036)	0.164*** (0.038)
Research funding	0.081*** (0.025)	0.104*** (0.027)	0.089*** (0.026)	0.163*** (0.027)	0.074** (0.024)	0.176*** (0.028)

Unstandardised coefficients are shown with standard errors in parenthesis. Only Model 2 is shown for each variable/group.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

media channels where the effect of active researchers while not significant in Model 1, becomes significant in Model 2.

z-tests for coefficient differences indicate that the effects of funding are significantly different for excellent and less excellent institutes: the effects are stronger for traditional media channels in excellent institutions ($b = 0.163$, $p < 0.001$) when compared to less excellent ($b = 0.089$, $p < 0.001$), and for new media channels (Table 1).

The funding effect is not a constant. We conducted a *t*-test to determine whether excellent institutions had more available funding in our sample. Indeed, it was shown ($t(901.017) = -5.762$, $p < 0.001$) that excellent institutes scored higher ($M = 3.20$; SD = 1.623) on our research funding scale than less-than-excellent institutes ($M = 2.61$, SD = 1.508). This difference is more patent in extreme value ranges (see Table S10).

To further examine the effects of research funding on the three dependent variables across levels of excellence, we plotted these effects, accounting for the controls, as shown in Fig. 2.

The regression slopes for excellent and less-than-excellent institutes allow for a visualisation of how the effect of funding differs by excellence level. Public events intensity, as previously noted, has the least differences among levels of excellence, as seen in the overlap between the slopes. For traditional and new media, differences are more prominent for extreme levels of funding, both on the lower and upper end: at the lowest levels of research funding, the effect of funding on communication activity is lower for excellent institutes; only at average levels of funding does the slope for excellent institutes intersect with the slope for less excellent institutes, meaning that only beyond this point does the effect of research funding become greater for excellent institutes. This suggests that, excellent institutes reap more benefits from funding than less excellent, as funding increases, which is particularly visible in the increased level of intensity of media channels.

Discussion

In this paper, we investigated public communication between institutes with varying levels of excellence in research. We find differences across institutes, and find that research funding is an important determinant of these differences. We make three main observations from the main findings and discuss consequences for public communication of research.

Firstly, differences in the level of public communication activity among excellent and less excellent institutes are found for all three dependent variables: public events, traditional media and new media; and these differences are significantly larger for media channels—both traditional and new media—for excellent institutes. Addressing our RQ1, we find increased activity among excellent institutes. The most important contributors to public communication intensity at both excellent and less excellent institutes are, by decreasing order, the existence of a policy and/or guidelines for public communication, the individual practices of researchers, and the available resources such as staff and funding at institutes. Funding is less important, yet it plays a part, even when accounting for the other variables. The models overall show that, regardless of the level of excellence, it is the commitment of institutions to public communication that most contributes to its public communication activity. This corroborates findings from a previous study of drivers of institutes' communication across countries and disciplines (Entradas et al., 2020), while also providing further evidence that the indicators used—and our framework—although incomplete, are appropriate to think about institutional public communication.

Secondly, the increased public communication observed among those institutes considered excellent in research stem from the research funding they attract. Models 2 and *z*-test coefficients suggest that despite all D variables making important contributions as described, significant differences between the effects of these variables are found only for research funding, which exerts a significantly stronger effect for excellent institutes. And, the fact that the effects of research funding are considerably stronger for traditional and new media channels than for public events, suggests that the effects of funding mainly result in media interactions and that excellent institutes reap more benefits to communication from funding. As we showed here, at the highest reported levels of funding, the level of public communication is significantly higher in traditional and new media channels for excellent institutes.

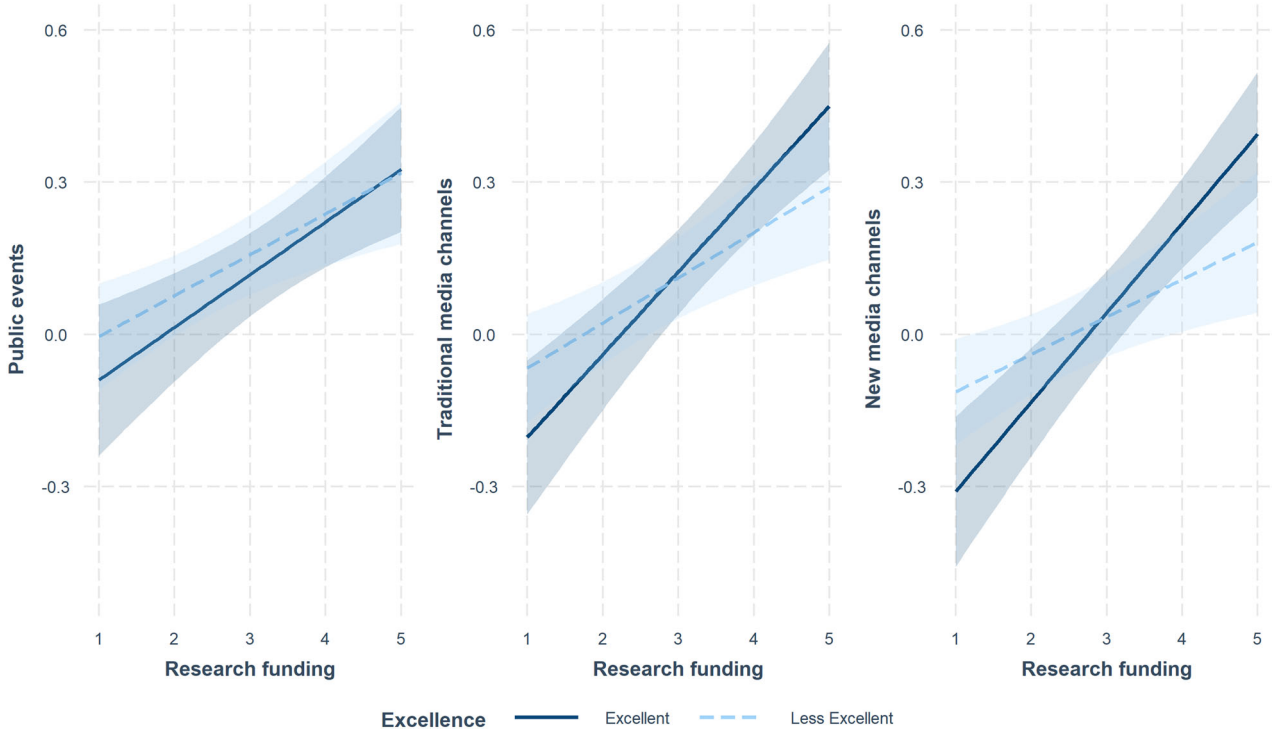

Fig. 2 Partial plots of the effect of research funding on communication activity, after accounting for the effect of control variables (*N* = 943). The error bands indicate 95% confidence intervals.

This apparent maximisation of the returns of funding in (media) communication, indicates that excellence in itself might facilitate media attention and excellent institutes may enjoy their 'excellence' status. It is perhaps intuitive that institutes holding high profiles and reputations, and obtaining top research grants and being involved in forefront research, are key targets for the media and journalists, and leaders in the increasing medialisation of higher education as they have more public visibility (Weingart and Maasen, 2007). This external demand and expectations could lead excellent institutes to invest more in communications if not for purposes of science communication and public engagement, then for external profiling.

Thirdly, the data also show that an important contributor to this increased media communication is the participation of 'active researchers'. When funding is added to Models 2, the explanatory power of 'active researchers' increases in both types of institutes, pointing to relationships with funding. This can possibly suggest that 'top' researchers receiving larger budgets, will tendentially engage more with the media and journalists, regardless of whether they work (or do not) in an excellent institute. This is in line with the large body of research on scientists' public communication that shows that the more academically productive researchers are also more likely to engage in outreach (e.g., Bentley and Kyvik, 2011; Entradas and Bauer, 2019). These studies have not considered the funding that researchers obtain or institutes' excellence but rather academic publications. Moreover, the fact that the effects of 'active researchers' are not significantly different for excellent and less-than-excellent institutes, suggest that researchers in excellent institutes are not engaging more in public communication as one could expect. Whether these effects of increased individual activity are driven by funders' requirements, we cannot tell from the data, but it is possible that those researchers involved in large funding applications are also more aware of their crucial role in fostering public engagement in research.

There are two important implications one can draw from these observations. First, the intense media communication among excellent institutes points to increased medialisation of science at these institutions; and suggests also an aspiration for public and media visibility on the side of excellent institutes that may see in the communication of 'research' an opportunity for building and maintaining an image and reputation, and for out-competing neighbor institutions in a system that supports them. A manifestation of the Matthew effect (Merton, 1988) might also be seen here at the level of communications. The funding may serve to enhance the visibility of already visible institutions and downgrade the visibility of institutions that are less preeminent. The current funding system may make it harder for less visible institutions to reach the public eye. Visible institutions may be satisfied to see their level of media interactions increase and to become visible in the public sphere, yet, whether this communication is contributing to the goals of public engagement and embedding public communication in institutes' culture is less clear.

Second, while an increase in media communication as a result of funding could be a positive sign that more research gets into the public domain and more researchers are engage with the media, it could also be a result of institutes' instrumentalising their scientists to get institutional public visibility (Marcinkowski et al., 2014). In fact, the effects of funding on public events are only small, suggesting that this funding related-communication is unlikely to result in institutes listening to or engaging in dialogue with their publics, as public engagement would require. Above all, it matters to ask what content is being communicated in the context of funding, and does it matter for the public? If the focus is on instrumental impacts, institutions may be losing opportunities for involving public in research initiatives and contributing to improving science literacy and informed decision-making. Institutes should critically look at what they want to achieve with their communications and what the outcomes of their communication efforts are. Future research into goals and contents disseminated in the context of research funding, as well as on institutional values that drive this communication will be needed to further understand these questions.

Limitations

This study despite making an important contribution to our understanding about public communication and excellence is research, is limited in some ways. Our models explain a good amount of the variance in activity in both excellent and less excellent institutes, yet further research should examine other variables to improve the explanatory power of the models. Good candidates would be the views on publics and public engagement, and goals and rationales for communication (self-interest versus public gain). Also, the response rate of 25% might appear low. However, this is on par with standards for online surveys and is considered a good target for organisational units (Sheehan, 2001; Shih and Fan, 2008).

Data availability

The data pertaining to this study are available from the corresponding author upon request.

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Note

1 The portuguese data were collected in 2015, as part of the pioneering study (Entradas and Bauer, 2017).

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Author contributions

ME (PI of the project) secured the grant. ME wrote the paper. JS conducted the analysis.

Competing interests

The authors declare no competing interests.

Additional information

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