

Researcher Engagement in Policy Deemed Societally Beneficial Yet Unrewarded

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Abstract:

Public support for research depends, in part, on the eventual societal benefits from research. Maintaining that support likely requires sustained engagement between the research community and the broader public. Yet, there is little organized effort to evaluate and reward such engagement in addition to research and teaching activities. Using data from an international survey of 1092 researchers (634 established researchers and 458 students) in 55 countries and 315 research institutions, we find that institutional recognition of engagement activities is perceived as being undervalued relative to its societal benefit. Many researchers report that their institutions would not reward engagement activities despite mission statements promoting engagement. Further, those institutions that actually measure engagement activities are perceived to do so in a limited capacity (respondents perceived that on average, 2 of the 7 dimensions of engagement we considered were reflected in evaluations). Most researchers are strongly motivated to engage for selfless reasons, which suggests that strong self-oriented incentives may have unintended effects. Perhaps by recognizing the important engagement activities of researchers, institutions can better achieve their institutional missions and bolster the crucial contributions of researchers to society.

Key words: science policy engagement; institutional reward; motivation; social benefit of research

Introduction

Public support for research has always been predicated on its immediate or eventual benefits to society (Sarewitz and Pielke 2007; Baron 2016). However, realizing these benefits often requires that researchers engage beyond academic communities, and such engagement actions depend in part on institutional support (Hauser and Katz 1998; Franceschini, Galetto et al. 2014). Despite the stated goals of research and scientific institutions to be for the public good, institutional values, strategies and

actions may dissuade researchers from activities that provide important public benefits (Hauser and Katz 1998; Brembs, Button et al. 2013).

Researchers' activities are often grouped into four broad categories: research, teaching, internal service (e.g. sitting on committees), and policy and public engagement (Lach, List et al. 2003; Singh, Tam et al. 2014). Engagement, defined as collaboration between research institutions and their larger communities for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity (Leshner 2003; Driscoll 2008), is broadly viewed as an important activity to be encouraged (Singh, Tam et al. 2014). Engagement programs at universities developed in the 1980s as a way to defend the public relevance of universities by ensuring academic involvement in societal progress and innovation (Holland 2016). Many research and scientific institutions have societal and policy engagement in their missions, yet previous research indicates that missions alone—without consistent institutional support in the form of funding and reward structures—are not enough to contribute to engagement (Ostrander 2004; Bernardo, Butcher et al. 2012; Fitzgerald, Bruns et al. 2016; Holland 2016).

Whereas research and teaching have relatively well developed – though controversial – metrics and processes for evaluation (e.g., impact factors, UK's Research Assessment Exercise, teaching evaluations by students and peers), the evaluation of engagement is at best, nascent (Brembs, Button et al. 2013; Baron 2016). A key complication for such metrics is that excellence in engagement is multi-dimensional (Taylor 2007). We recognize at least seven dimensions, building upon factors that contribute to, and outcomes that result from, successful engagement (Franz, Childers et al. 2012) via a group workshop at the Global Young Academy. These dimensions of engagement include *reach* (the size of the audience), *rigor* (quality of the research), *innovation* (novelty of engagement), *number* (quantity of effort), *research depth* (amount of work behind each effort), *prominence* (perceived esteem of the effort), and *outcomes* (changes as a results of the effort, see Table S1 for dimension descriptions). In recognizing the multi-

dimensional nature of engagement excellence, we can evaluate what aspects are most emphasized by research institutions.

Alignment between goals and metrics is desirable. In the design of evaluation and reward structures, existing perceptions of engagement are important—particularly the perceived societal benefit of engagement and its motivations. Although perceptions may differ from reality, they are important because they serve as the foundation for behaviour (Jones and Nisbett 1971; Lerner, Li et al. 2015). Such perceptions are key for determining whether individual and institutional goals align with each other or with evaluation metrics. Previous research indicates that motivated individuals engage more effectively when they are committed to an organization that shares their values and supports their activities (Jin, McDonald et al. 2016). When researchers are incentivized to perform activities seen as having little value or when institutional rhetoric (that promotes activities of perceived societal benefit) is not matched by evaluation metrics, researchers may adopt apathetic or cynical attitudes towards their work (Colvin and Boswell 2007). Alternatively, they may take up activities with perceived societal benefit (contributing broadly to a perceived better world) at the risk of their careers. In this study, we investigated researchers' perceptions of social importance and institutional rewards of various researchers' activities, with a focus on the evaluation of and motivation for engagement activities.

We conducted an international survey compiling perceptions of 634 established researchers and 458 students (together referred to as researchers) across 315 institutions in 55 countries. We included current researchers as well as students to capture views of the current and emerging researchers. If evaluation metrics aligned with institutional rhetoric regarding social benefit, we would expect to see a close correlation between perceived societal benefit of and perceived reward for various endeavours (i.e., research, teaching, internal service and engagement). We hypothesized further that engagement activities are evaluated on an *ad hoc* basis and considered narrowly relative to dimensions of engagement excellence. Finally, we expected that different motivations (including self-oriented ones

such as career benefits and selfless ones such as combatting poor policy) would correlate differently with the five engagement activities that we considered (Singh, Tam et al. 2014).

Methods

We distributed an online survey questionnaire to established researchers and students around the world. Survey dissemination was conducted using snowball sampling over researcher listservs (including the listserv for the Society of Conservation Biology and the Ecological Society of America), as well as through the Global Young Academy and the Leopold Leadership Fellows organization, asking recipients to forward the survey to their colleague networks. Targeted sampling was also performed, with invitations to partake and disseminate the survey to heads and deans of research organizations. The survey was open to any researcher from any discipline or organization, though most respondents were natural scientists and interdisciplinary scientists from academic institutions in North America (there was also relatively strong representation from other countries such as Australia, Brazil, Japan, South Africa, Turkey, and the United Kingdom, Table S4). Our questions focused on the institutional metrics and perceived level of reward and societal benefit for various activities (research, teaching, internal service and engagement) as well as how engagement is evaluated. We further broke down engagement into five categories adapted from Singh et al. (Singh, Tam et al. 2014), adding a category of participatory research with stakeholders.

In total, 634 established researchers and 458 students across 315 institutions and 55 countries participated in the survey (Table S4). We used Likert scales to quantify directional categorical responses to questions about societal benefit, institutional reward, and quantity of engagement, as well as levels of agreement to statements of researcher motivations to engage. We concluded the survey by asking respondents if they would like their institutions to consider different forms of engagement in

established metrics, with higher emphasis in rewards, or not at all. All demographic information was collected at the end of the survey.

Because we used a snowball sampling approach, we risked a sampling bias that was in favour of engagement. We tested for pro-engagement bias in the survey by first comparing the proportion of research institutions with a mention for engagement or public service in our sample to a random sample of universities around the world. We found a near-identical proportion (81% versus 82%). Second, we compared responses in perceived institutional reward, societal benefit, perceptions on whether researchers were doing more engagement than their institutions rewarded for, and motivations to engage among members of the Leopold Leadership Program and the Global Young Academy (all whom are members because of their desires to engage with policy and the public) with all other respondents. We found all responses nearly identical in their response patterns, indicating that respondents with known pro-engagement views did not bias the sample. While this might also indicate that all respondents have pro-engagement bias and does not reflect the larger researcher community, we note that our large sample may buffer against extreme responses, but that even a biased sample can showcase a sub-population of pro-engagement researchers in institutions. If institutions are not satisfying their motivations that means an entire group of researchers may be underserved by their institutions, especially if those institutions have pro-engagement mission statements.

We used heatmaps and barplots to visualize data on perceptions, and model averaging methods to explore the relationships between stated motivations to engage and levels of engagement behaviour (i.e. how often experts actually contributed to different engagement activities). To aid in interpreting the resulting regression coefficients of the model averaging, we put all explanatory variables on a common scale by dividing each by two standard deviations (Gelman 2008). Model averaging is an information theoretic approach (comparing models based on how well they account for information in the data) that examines an exhaustive set of models that can be constructed given the independent

variables identified, and considers the fit of each model to the data (Burnham and Anderson 1998). For each model, we used ordinary least squares multiple regression and calculated Akaike weights based on the small sample size corrected Akaike's Information Criterion – a metric that balances model fit and complexity (AICc); these weights were used to calculate model-averaged coefficients for each variable. For each engagement activity for both established researcher and students, we explored all possible 2048 candidate models to generate the model-averaged coefficients. Where predictor variables (stated motivations) had strong support (the 95% confidence of model-averaged coefficients did not cross 0) we discuss the relationship between motivations and levels of engagement behaviour. We assessed the explanatory power of our model-averaged results by comparing the rank of a null model (with no independent variables) against our top-ranked models (Singh, Tam et al. 2014). All models except for models predicting the frequency of students acting as a decision-maker were found to have high explanatory power, as null models were ranked very low in every other engagement category for established researchers and students (Tables S5 and S6). The low explanatory power for models of students acting as a decision-maker likely reflect that very few students indicated that they acted as a decision-maker at all.

We examined differences in responses among geographies (North America, Latin America, Europe, Central Asia, North Africa, and the Middle East, East and South Asia, Sub-Saharan Africa, and Australia and New Zealand) and disciplines within established researchers and students, and found that results were surprisingly consistent among these classes. We also found that responses were largely consistent between established researchers and students, though we chose to report these results separately because of the different experiences the two groups have and the different implications the results have between these two groups. We further examined differences between early career and late career researchers (pre-and-post tenure) and students aiming for an academic career versus those aiming

elsewhere regarding their motivations. For all analyses we used the statistical software R (Team 2013).
Data is available (minus any personal identifying information) by requests to the corresponding author.

Results and Discussion

Engagement is valuable but garners little reward

Perceptions of the societal benefit of researcher activities did not align with perceived institutional reward. These results were consistent across nations, genders, research disciplines, and also between established researchers and students. Both established researchers and students almost invariably perceived engagement to have high societal benefit (Figure 1, Table S3); however, the apparent institutional reward was variable, with most respondents indicating slight reward across career stages (Figure 1, Table S2). Research presents the opposite misalignment. Almost invariably, research was seen to be highly rewarded across multiple evaluation processes (Figure 1, Table S2). Established researchers reported greater perceived societal benefits of research than did students, though both groups viewed research as having less societal benefit compared to teaching and engagement (Figure 1, Table S3). Prevalent perceptions that research is highly rewarded are unsurprising given the many established metrics used to judge research (e.g., publication counts, impact factors, h-indices), metrics which contribute to securing grants and increasing an institution's renown. Perhaps more surprising is that research was not uniformly perceived to contribute to high societal benefit. These results align with arguments that research without engagement leaves important insights stranded from real-world impact (Bowen and Graham 2013), or that there is a low likelihood that any individual research finding will lead to benefits (either societal benefits in general or benefits to further research efforts) (Nielsen 2001).

Perceptions of institutional reward for teaching and internal service varied across career stages more than for research and engagement (Table S2). Both established researchers and students perceived

moderate societal benefits and institutional reward for internal service. Perceptions of teaching paralleled engagement, with student respondents perceiving fewer societal benefits than for engagement, likely because students' main teaching activities are through teaching assistance. Notably, both established researchers and students perceived the societal benefits of engagement at levels comparable to how researchers perceived the societal benefits of teaching, which are perceived to be of higher societal benefit than research or internal service (Table S3).

Institutional rewards were not aligned with stated institutional missions regarding engagement. We found that 81% of the 315 research and scientific organizations represented in our sample included engagement, social service, or public dissemination within their mission statements, stated values, and organizational strategies. We corroborated this using a random sample of global universities: 41 of 50 universities include engagement, social service, or public dissemination within their mission statements and institutional descriptions. This mission statement rhetoric did not alter the perception of whether institutions reward researchers' engagement activities. Mission statements alone do not yield reward systems for engagement, and they are insufficient to promote it (Fitzgerald, Bruns et al. 2016; Holland 2016; Jin, McDonald et al. 2016).

Engagement: hardly any is more than enough

Across multiple forms of engagement, many established researchers and students indicate that they are doing more than their institutions reward—even those doing 1-3 engagement activities a year (Figure 2). Most individuals who report zero engagement activities nevertheless report that they are doing as much as their institutions reward. For example, 52% of survey participants who indicated that they do not participate in advocating for policy positions or acting as a decision-maker reported that their institution would not reward them for doing so.

Consistent with the paucity of institutional reward for engagement, we found low levels of reported engagement activity across diverse forms of engagement (Fig 2). The apparent infrequency of researchers taking a stand on policy positions or acting as a decision-maker may also reflect the (contested) opinion that these activities may compromise academic rigor or integrity (Nielsen 2001), an opinion perhaps reinforced by the lack of rewards for these activities. Among the respondents who engage in policy advocacy or who act as a decision-maker, 35% indicated that institutions should place more weight in evaluating these activities; 31% suggested that institutions should employ additional metrics; 16% favoured institutions placing higher expectations on these activities; and only 12% suggested that they should not be rewarded for these activities.

Many dimensions of excellence are not perceived to be assessed

Currently most institutions have only unstructured ways to assess engagement—when it is assessed at all. Most respondents whose institutions assess engagement indicated that their institutions request qualitative, free-written descriptions. While these free-form evaluations are not in themselves problematic, researchers perceive that institutions only evaluate a limited set of dimensions from these narratives. Respondents indicate that their institutions consider the number of engagement activities, and how prominent the activities are (e.g., op-eds in prominent newspapers being more prominent than posts on a seldom-visited blog, Figure S1). The actual outcomes of engagement activities are considered infrequently (30% of established researchers and 16% of research students).

Our results indicate that the dimensions of engagement addressed by current evaluations do not align with researcher motivations. For example, whereas ‘prominence’ (i.e., perceived esteem) was one of the most frequently evaluated dimensions of engagement, ‘status’ (i.e., standing relative to other researchers) was generally cited as a weak motivator for engagement. In contrast, many researchers and students are motivated to engage for societal obligations and promoting public benefits (Singh, Tam et

al. 2014)—e.g., to educate or excite the public, to fulfil a sense of social responsibility, and to affect the larger world (Figure 3). In short, many established researchers and students engage (or wish to engage) specifically for the *outcomes* of engagement. Nevertheless, institutions often overlook outcomes of engagement in their evaluations.

Diverse motivations to engage, mostly selfless

Researchers report diverse motivations for engagement, and these are mostly other-oriented (Figure 3; e.g., engaging to foster a better world, to fulfil a sense of social responsibility, to excite the public and build greater research comprehension, and to improve policymaking). In contrast, very few researchers indicated that they are not motivated to engage at all. Across nations, career position, and disciplines, individual-oriented motivations (e.g., raising status as a research personality, develop communication skills and gain career benefits) were the least important motivations stated by respondents (Figure 3). The prominence of other-oriented motivations found in this study is in agreement with psychological research, which shows that acting on other-oriented motivations provides benefits, such as fostering a sense of purpose and satisfying psychological and social needs (Crocker, Canevello et al. 2017). Only two groups of respondents in our study appeared to have much of an interest in engagement for personal gain (and these remained less important drivers than other-oriented ones, Figure 3): established researchers with vertical mobility (i.e., untenured professors)—who indicate motivations for career benefits and raising status—and research students seeking an academic career, who indicated motivations for raising status.

Incentives and other-oriented motives predict activity

For both established researchers and students, stated motivations significantly predicted recent engagement activity (Figure 4). For established researchers (but not students), perceived institutional reward for engagement also correlated with engagement activities. Consistent with the above emphasis

on social motivations, many other-oriented motivations positively predict engagement behaviour. The motivation to combat poor and ideological policymaking correlated positively with advocating for a policy position (for both established researchers and students). Those who were more motivated to develop communication skills were more likely to conduct participatory research with communities (for established researchers). Some self-oriented motivations were actually negatively correlated with policy advocacy (for students); e.g., those students indicating stronger motivations for career benefits were less likely to advocate for policies. Established researchers who perceived institutional rewards for engagement were more likely to integrate research into policy, act as a decision-maker, and conduct participatory research. Similarly, disagreement with being unmotivated to engage was positively correlated with interpreting research for policy (for established researchers).

Future Directions

Respondents perceived a paucity of rewards and evaluation metrics for engagement despite its perceived high societal benefit. While our survey results may be a product of a selection bias for pro-engagement participants, our tests for bias did not indicate this, which suggests that our findings are more general across researchers (see Methods). At the very least we reveal that there are large groups of researchers around the world who feel that their institutions (most often with mission statements including engagement) do not adequately monitor and reward engagement. Similarly, our results report perceptions, which may not accurately mirror the reality of reward for engagement. If perceptions are indeed wrong across the wide swath of institutions and countries we investigated, our results could indicate that engagement is not rewarded *enough* for researchers to perceive them and be encouraged to engage.

Addressing the discrepancies between societal benefit and institutional reward is not straightforward. Seeking to incentivize engagement, institutions could usher in new evaluation metrics and processes.

Some new metrics, or a broader application of existing ones, may well encourage researchers to engage (Lane 2010). However, we would urge keeping two considerations firmly in mind. First, evaluation processes that provide self-oriented benefits for activities may have unintended consequences (Bowles 2008), particularly given the strong other-oriented motivations at play. New self-oriented incentives can ‘crowd out’ existing intrinsic motivations (Gneezy and Rustichini 2000), undermining or distorting the desired behaviour. Designed correctly, e.g., to reinforce the prevailing notion that the activities are socially beneficial, new incentives may actually leverage and augment existing motivations (Rode, Gómez-Baggethun et al. 2015). Incentives that are likely to ‘crowd in’ existing motivations are generally non-monetary, and often involve public recognition or institutional metrics and other signals that engagement is a socially desirable behaviour.

Second, institutions would do well to mind Goodhart’s Law: metrics and rewards can quickly generate perverse outcomes as individuals seek to fulfil metrics divorced of their underlying intent (Elton 2004). Virtually all metrics are subject to such perversion, so perhaps the task at hand is to design adaptive processes. The rise of peer reviews of teaching constitutes one such adaptive process: in contrast to the largely quantitative nature of student teaching evaluations, which are subject to manipulations for perverse outcomes, peer reviews of teaching are richly multidimensional. Perhaps similar processes would be beneficial in evaluating the rigor, innovation, outcomes, and other dimensions of engagement.

Regardless of one’s favoured solutions, the discrepancies we highlight put the onus squarely on institutions serious about societal benefit to reconsider their evaluation and reward structures regarding engagement (Carpini, Cook et al. 2004). Among those employed in research positions, we detail widespread agreement that societal benefit is found not only (or even primarily) in research *per se*, but most strongly in teaching and engagement. Given that there is some evidence of a trade-off between engagement activity and research output (Jin, McDonald et al. 2016), rewarding engagement in addition to research can avoid disadvantaging the career advancement of researchers who engage. In short,

research institutions espousing public benefits would do well to acknowledge the importance of engagement and teaching, and to reward these activities commensurate with their importance to institutional missions.

Strong institutional support for teaching and engagement may be especially important to convey to students and other emerging researchers, who are often excited to engage but who face the apparent reality that only research is strongly valued by their institutions. Despite this ostensible institutional value, our results indicate that students express uncertainty about the value of research *per se* to society. Perhaps students would be served well by institutional reforms of assessment processes to reflect not only the increasingly diverse research-based professions outside of academia (Cyranoski, Gilbert et al. 2011), but also the strong motivations to engage. Doing so might help align institutional engagement processes with their mission statements, and the motivations of the next generation of researchers (Jin, McDonald et al. 2016).

The need for engagement has never been more critical (Taylor 2007; Baron 2010; Baron 2016; Richmond 2016). Nevertheless, research institutions' current practices make such activities difficult, effectively imposing strong disincentives to spend time on tasks that are effectively uncompensated relative to research, which is consistently rewarded. Now is the time to ensure that the *engagement* of research is evaluated and rewarded; rewarding research production is not enough.

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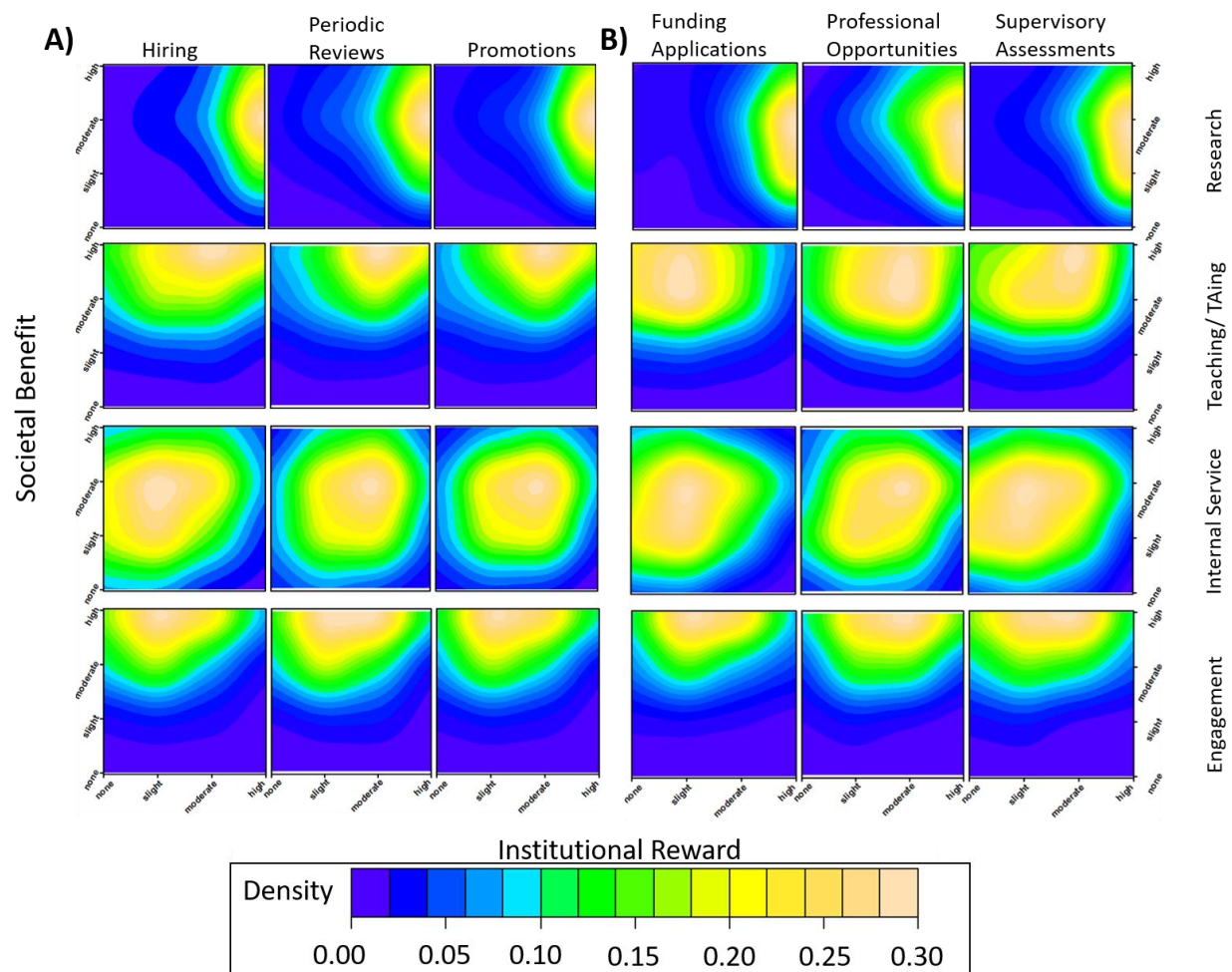
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395 Figures:



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397 Figure 1. Perceptions of institutional reward and societal benefit of activities for A) established
 398 researchers and B) research students. The warmer colours (white, orange, yellow) denote regions of
 399 high frequency of response, whereas cooler colours (purple, blue, green) indicate lower frequency.

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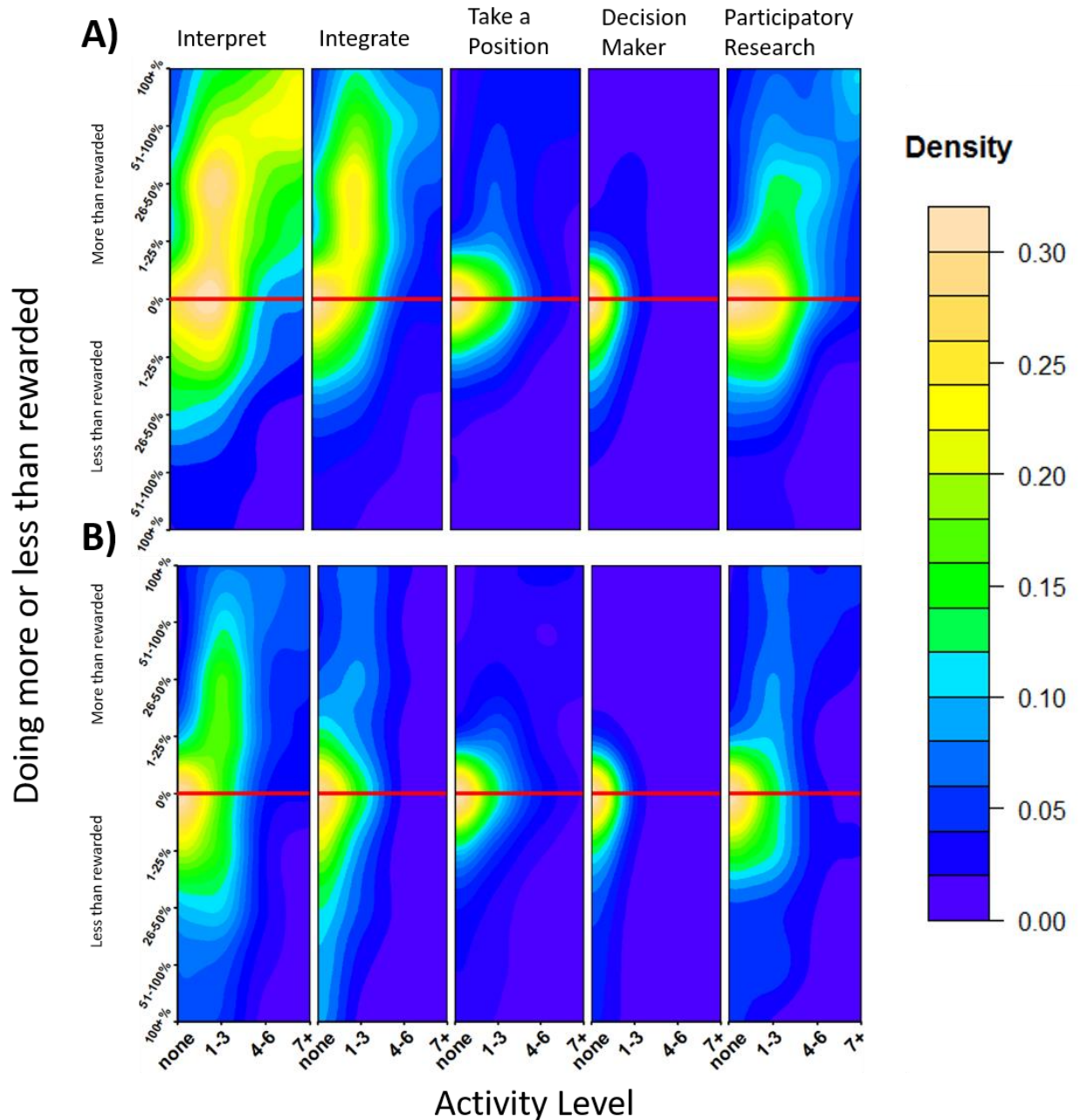


Figure 2. The degree to which respondents think they are doing more or less engagement than rewarded by their institutions. Plots show responses for A) established researchers and B) research students. The warmer colours (white, orange, yellow) denote regions of high frequency of response, whereas cooler colours (purple, blue, green) indicate lower frequency. The x-axis scores correspond with frequencies of engagement activities in a year, and the y-axis scores

correspond to the extra engagement (as a percentages of current activity levels) that institutions would reward for (“less than rewarded”) or the amount of extra engagement (as a percentage of the level that institutions reward for) that participants engage in that institutions do not reward (“more than rewarded”).

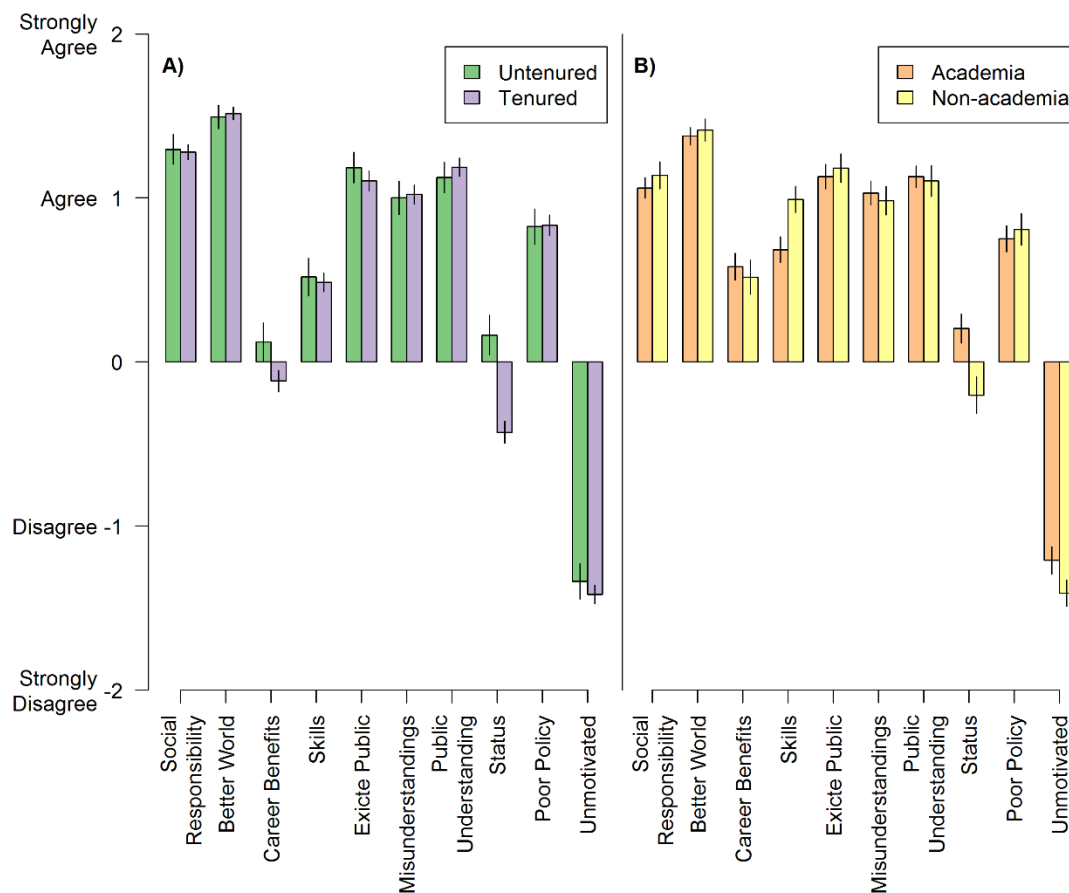


Figure 3. Respondents’ expressed agreement to statements about their motivation to engage for A) established researchers, separating tenured from untenured; and B) research students, separating those intending careers in academia from those not.

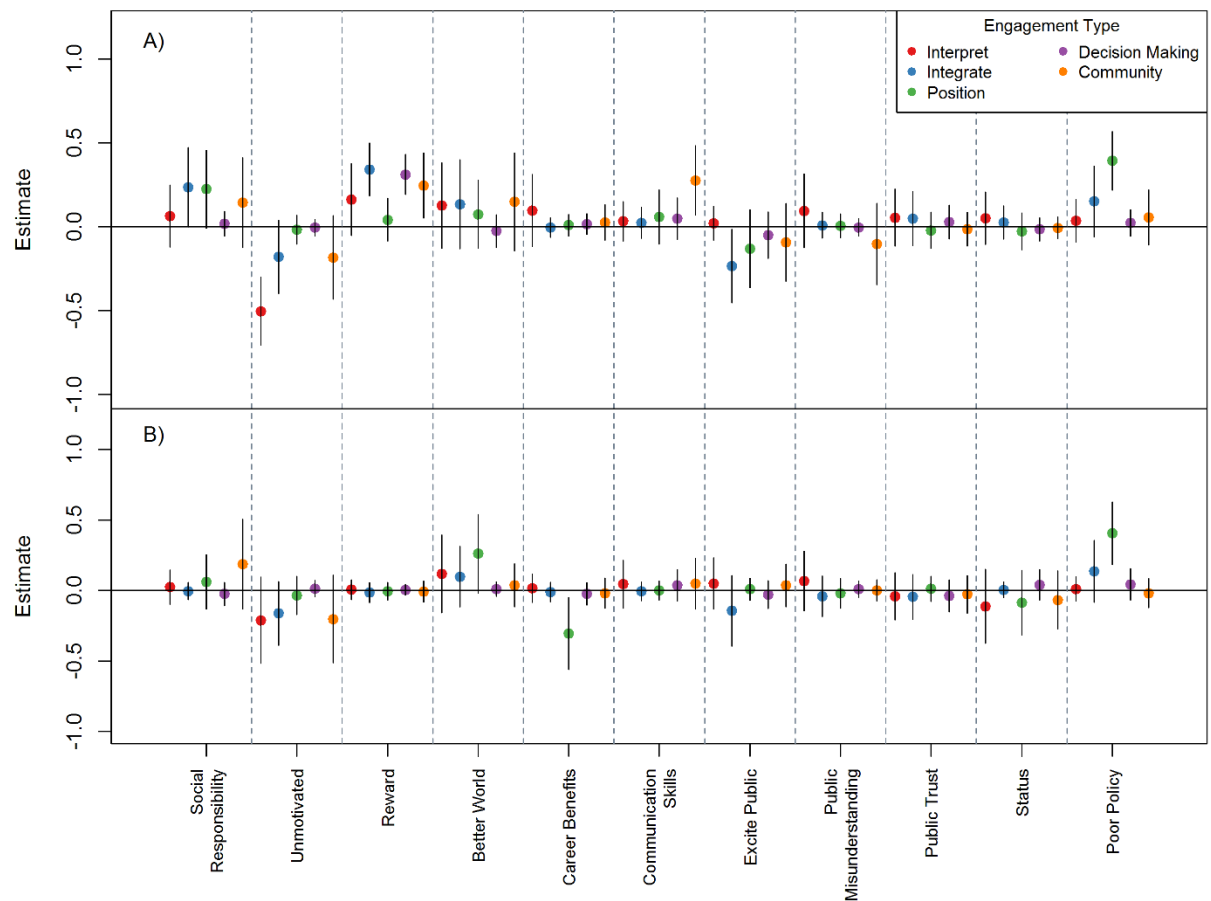


Figure 4. Regression coefficients for how eleven motivations explain variation in each type of engagement activity (interpret, integrate, taking a position, acting as a decision-maker, and participatory research with communities). Points represent model-averaged standardized coefficient scores, and bars are 95% confidence intervals. Panels represent A) established researchers and B) students.