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Factors enabling and constraining research in a small, research-intensive South African University

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Abstract

Research is increasingly regarded a core facet of university endeavours globally, and research profiles of universities, institutes, and colleges are commonly used as one measure for ranking them. University administrations and funders would be better able to stimulate research if they had insights into context-specific, institutional constraints, and enablers. Yet, there is surprisingly little research on the determinants of research productivity amongst academics employed in the higher education sector, particularly in the global south. Barriers and enablers of research at the individual level may differ, and experience of such may vary across career stage. The objective of the research reported here was to determine what enables and motivates some academics at Rhodes University (South Africa) to do research, what problems and constraints may be making it difficult for those who may wish to do more, and how do these vary in relation to research career stage. An anonymous online survey, with follow-up focus group discussions was used to collect the data. Results show similarities to studies in developed countries, but also reveal disciplinary and career stage differences, which suggest that institutional policies need to take these factors into account when designing support or incentives.

Key words: research; enablers; constraints; productivity; career stage.

1. Introduction

Research is increasingly regarded a core facet of university endeavours globally (Dundar and Lewis 1998; Baskurt 2011; Duffy et al. 2011; White et al. 2012). Research profiles of universities, institutes, and colleges are commonly used as one measure for ranking them (Baskurt 2011), and a strong research profile attracts leading researchers, postgraduates, as well as donor and contract funding for research (White et al. 2012), and is assumed to underpin better teaching of critical thinking and innovation (Artés et al. 2017). These all add to an institution's 'reputation' amongst a variety of stakeholders, and consequently, many institutions reward research and researchers more than other contributions, such as teaching. The strength of an academic's research profile is one of the main considerations in securing employment, tenure, and promotion, and also influences individual salary levels in some institutions (Barham et al. 2014). However, there is also an emerging voice of opposition to the 'dominant regime' demanding ever-increasing numbers of publications in high impact factor journals (Muller and de Rijcke 2017).

Given that research is increasingly important to university profiles, and some would argue economic and societal development (Freeman 2002; Toole 2012), it is presumed that university administrations and funders would be better able to stimulate research if they had insights into context-specific, institutional constraints, and enablers (Horodnic and Zaiţ 2015). The context specificity is paramount because the nature, intensity, and interaction of barriers and enablers will vary between countries and between universities within a single country, and even through time.

At the meso-level, Paradeise and Thoenig (2013) argue that higher education institutions can be divided into four types, depending on the amount of attention that they give to 'excellence' versus 'reputation' as measures of academic quality. Excellence is here defined as acontextual and analytical, based on ordinal indicators such as those used in international higher education ranking systems. Reputation is a less exact concept, which depends very much on context and uses implicit, non-comparable measures of 'quality', linked to image or brand.

Paradeise and Thoenig (2013) then construct a typology of universities within this model: 'The top of the pile' are those institutions who pay much attention to both reputation and to quality. These are the elite, internationally recognized, often older universities who always feature prominently in international rankings. 'The Venerables' are those institutions who pay attention to reputation but give less weight to measures of excellence, which they regard as absurd or dangerous. 'The Wannabes' pay much attention to excellence but may have little international reputation. They are often focused on improving their formal rankings as a way of competing with 'The top of the pile'. Finally, 'The Missionaries' pay little attention to either reputation or excellence but see themselves as egalitarian providers of public goods through mass education.

Depending on their type, different values and management styles can then be identified. For example, Wannabes put great emphasis on achieving the research output goals needed to achieve their excellence ranking ambitions, such as providing financial incentives for publication in high-ranking journals, and an aggressive focus on research through a centralized and hierarchical power structure. Venerables, on the other hand, have a very flat hierarchy, and great importance is placed on collegiality. Resources are allocated based on the rank and reputation of individuals, and initiating change, unless it clearly serves the collective purpose, is frowned on. Unlike Wannabes, in Venerable institutions, academics dominate managers (Paradeise and Thoenig 2013).

Thoenig and Paradeise (2016) also point out that the strategic capacity of universities depends on their type. Based on in-depth case studies of 17 universities in six countries, they find that Wannabes and Top of the Pile institutions generally have more strategic capacity than Missionaries and Venerables. The Venernables in particular have long time horizons for implementation and are resistant to change (citing their currently high reputation as being the result of how they have done things in the past). Strategizing is seen as having limited importance and tends to be delegated to management.

Being one of the oldest universities in South Africa, Rhodes University (RU) could be classed, in terms of both values and organizational culture, as one of the 'Venerables' (at least in its national context). However, as Paradeise and Thoenig (2013) point out, the rising importance of research outputs as both a measure of 'excellence' and, in the South African scenario, an important source of funding, is putting pressure on the institution to change. This is creating significant organizational tension between the old, collegial way of doing things and new systems with a more centralized and hierarchical management style that focuses much more on research. Venerable universities also tend to be those with less strategic capacity, which means that they may be seriously destabilized by external contextual changes (Thoenig and Paradeise 2016).

Yet, there is surprisingly little research on the determinants of research productivity amongst individual academics employed in the higher education sector generally, and much of what there is tends to be from a North American context, and focused generally on the teaching, research and administrative mix, and financial rewards for these various activities (Boyer 1990; Binder et al. 2012; White et al. 2012; Barham et al. 2014). Much of this discourse concludes that teaching, particularly undergraduate teaching, is not financially rewarded, perhaps because it is perceived to be of a lower status, and every academic has to do it. On the other hand, research, and to some extent, administrative duties (such as being a Head of Department/School or Dean) are associated with higher levels of remuneration.

In 'Scholarship Reconsidered', an early report on the professoriate in the USA, Boyer (1990) raised concerns about the impact of the focus on research, and proposed four types of scholarship: discovery (the traditional view of research), integration, application, and teaching. He argued for the widening of the traditional view of research, and a re-calibration of the system of rewards to take this into account. Yet, in a study done more than 20 years later, Binder et al. (2012) find that the remuneration and prestige of academics in the USA is still positively related to research output, and that 'teaching is at best neutral, and at worst penalized'. They point out that the vision of the teacher–scholar, whose research also informs and enriches teaching, may not be generally achievable. While acknowledging that teaching and research can be complementary, in the sense that time and effort are inputs into both, taking on more of one activity usually implies less of the other. In this sense, teaching and research are more likely to be competing for the scarce resources of time and energy, rather than being complementary.

In terms of the motivation, or incentives, specifically for undertaking research, the focus has tended to be on the impact of financial rewards, despite the finding by several studies (Andersen and Pallensen 2008; Butler 2003; Lam 2011), that money is often not the primary driver of academic research output. Standard utility theory in economics suggests that offering incentives, such as personal financial rewards, will increase effort. However, motivational crowding theory (Frey and Jegen 2001) suggests that financial rewards or punishments can have counter-intuitive effects, depending on the original motivation for undertaking the activity. Andersen and Pallensen (2008) found that, in government-funded research institutions in Denmark, providing direct financial incentives for research outputs had mixed effects: 'When the incentives are perceived to be supportive, stronger publication incentives increase the number of publications in research institutions. On the other hand, when the incentives are perceived as controlling, stronger publication incentives reduce the number of publications' (Andersen and Pallensen 2008: 41). The findings showed that, especially for highly skilled professionals who have their own professional standards and strong intrinsic motivation, financial incentives may have a negative effect on research output. This points to the need to differentiate intrinsic motivations of researchers from extrinsic ones (Horodnic and Zaiţ 2015). Research institutions and managers can provide incentives or strategies to promote extrinsic motivators or enablers, whereas if the primary motivations are intrinsic, then the most rewarding strategy would be to seek means of identifying and employing such researchers (Horodnic and Zaiţ 2015).

A related article by Lam (2011) investigated what motivated natural scientists in the UK to undertake applied industrial research: 'gold [financial rewards], ribbon [recognition], or puzzle [intrinsic satisfaction]'. Lam (2011) addresses the concern that academic endeavour in the UK is becoming too 'commercialised', where the rewards for scientific discovery are no longer primarily recognition or the intrinsic satisfaction of solving a problem, but primarily financial, thus undermining 'the reputation-based reward system'. However, findings showed that the majority of researchers were motivated by 'ribbon' (i.e. reputation), which was seen as a means to access more resources for their research. In addition, 'enjoyment-based intrinsic motivation' related to puzzle-solving was found to be a very important factor determining involvement in applied research. Lam (2011) suggests that, rather than direct financial rewards, additional research funding and recognition of academic status would be powerful motivators. How these might differ by

career stage or even discipline remains to be investigated. Indeed, most studies are within a single discipline (White et al. 2012; Ryan and Berbegal-Mirabent 2016; Paul et al. 2017) which precludes the framing of insights across disciplines.

Institutional factors also matter, as Heinze et al. (2009) show in their study of the research productivity of natural science research groups in Europe and the USA. Based on 20 case studies, their findings showed that highly productive research groups were enabled by: relatively small group size (6–8), stable and flexible research funding, access to complementary technical and scientific skills within the institution, individual research autonomy within the group (after long-term goals were defined), and 'mutual curiosity and interest'. Productive research groups were also characterized by frequent collaboration with external organizations and effective group leadership. They also found that successful group leaders had often been in the same institution for many years, some for their entire career. At advanced stages of the research process, research groups were found to be highly motivated by the competition to make the discovery first and thus gain academic reputation. In emerging fields, or at the start of the research process, competition played much less of a role.

From the above it is evident that there are a wide variety of factors that motivate and constrain research productivity including time, personal traits (curiosity, motivation), and organizational and institutional factors (work allocation, funding, incentives). The objective of the research reported here was to determine what enables and motivates some academics at RU (South Africa) to do research, what problems and constraints may be making it difficult for those who may wish to do more, and how do these vary in relation to research career stage.

2. Study setting

RU is one of the oldest, yet smallest universities in South Africa. It has about 380 academic staff and a student body of approximately 7,400 students, of which about 31% are postgraduates. Within the South African context, it is a research-intensive university, and on a per staff capita basis is within the top five in South Africa.

A significant funding stream available to South African universities is a research output subsidy from the national Department of Higher Education. Under this scheme universities receive funds from the national department for all research outputs in 'accredited' fora and for each graduated Masters and PhD student.

An 'accredited publication' is a term used by the South African Department of Higher Education and Training for subsidy earning research outputs. These include articles published in the list of approved scholarly journals, peer-reviewed books, or book chapters and publications in peer-reviewed conference proceedings. Department of Higher Education and Training (DHET) recognizes publications only in academic journals that have a stringent peer-review policy for acceptance of manuscripts prior to publication, and provide a list of titles (Government Gazette, Vol. 597 No. 38552: March 2015).

This funding stream accounts for 15–30% of the total state funds provided to research universities. Hence, most university administrations place considerable emphasis on encouraging their staff to produce accredited research output and to graduate Masters and PhDs. This may take various forms, including supplementation of research staff salaries in relation to the number of outputs, contributions to staff research accounts, or increased promotion prospects. Somewhat atypical in the South African context, at RU there is no direct sharing of the research subsidy income with the researcher either personally or into their research grant within the university.

3. Methods

A mixed-methods approach was adopted. The first was a structured questionnaire that could be filled out online or in hard copy. The questionnaire had 4 sections and 39 questions. It was acknowledged that, while research output could be measured directly through the production of accredited articles, books, or book chapters, such a measure would not account for differences between faculties and academics at different stages of their careers. Self-assessed relative measures were thus also included. The questionnaire was initially designed by the authors with inputs from Ms Noelle Obers. It was then discussed at the RU Research Committee, and suggested changes made. It was submitted to the RU Ethical Standards Committee, where it received ethical approval.

All academic staff were alerted and encouraged to complete the questionnaire via a communication from the Deputy Vice-Chancellor of Research. A direct communication was also sent to all Heads of Departments in the university requesting that they encourage their staff to complete the survey. Another was sent to the research Listserv of the university which includes most active researchers. Two reminders were sent on all these streams. Responses were received between 25 May 2015 and the 11 July 2015. The vast majority (92%) of the 174 responses were received via the online version of the survey.

The second approach was an open-ended section at the end of the structured questionnaire. In this section respondents were invited to contribute comments on any other aspects of research ethos, support, and productivity at RU, that they felt had not been adequately captured within the questionnaire, or to elaborate further on issues that were covered in the questionnaire. Just over half of the respondents (101) posted comments, with most posting several. Data analysis involved summarizing and interpreting the data via thematic analysis to identify, analyse, and report themes within the narrative data (Braun and Clarke 2006). This was achieved via multiple readings of the comments and narratives of the respondents, noting recurrent comments or patterns (Vaismoradi et al. 2013), using annotations and coding in the margins. Similar codes then identify text on a coherent theme, which are presented below.

The third approach was hosting of focus group discussions (FGDs). At the end of the questionnaire, respondents were able to express their interest in attending follow-up FGDs. They could do so by sending their name to a designated administrator independent of the questionnaire which ensured their questionnaire responses remained anonymous. Twenty-one staff responded that they wished to attend a FGD. On the four dates offered for FDGs nine staff attended. Each FGD lasted approximately 2 h and deliberated on core themes emanating from the results of the questionnaire.

The FGDs were facilitated by the second author and were in open format allowing participants to identify and discuss any themes or issues that they wished to air pertaining to research at RU. Additionally, six issues were identified from the draft quantitative and qualitative data from the questionnaires which we thought required greater interrogation, namely (1) what motivates or demotivates staff to engage in research, (2) postgraduates as research, (3) how might departments allocate and balance time demands of

Table 1. Characteristics of emerging, established, and advanced researchers

Variable	Emerging (n = 93)	Established (n = 65)	Advanced (n = 16)
Percentage who regard publishing in peer reviewed journals as 'very important'	68	75	81
Percentage with >0 accredited papers	85	92	100
Average number of accredited papers in the last 3 years	4.57	9.65	28.25
Percentage who regard research output as 'above average'	17	40	56
Percentage who have completed PhD	53	94	94
Average years employed at RU	7.2	10.8	16.0

different roles that academics must fulfil, (4) do collaborations increase research quality and/or quantity, (5) RC grant in facilitating research, and (6) conferences in aiding research. The free nature of the FDGs meant that many of the considerations overlapped between the six issues. Comments were recorded on charts during the discussions, summarized and sent back to FG participants for approval as a record of the group discussion.

Much of the empirical data are presented by means of descriptive statistics in tables and figures. Additionally, we undertook a simple ordinary least squares (OLS) analysis to identify statistically significant determinants of research output. The dependent variable was the number of accredited outputs (single or co-authored) produced by respondents in the 3 years preceding the study.

4. Results

4.1 Respondent characteristics

Approximately half (174) of the academic staff at RU responded to the survey, of which just over half were male (55%) and the majority (70%) had a PhD. The largest group (43%) had worked at RU for between 5 and 9 years, 27% up to 4 years, and 23% between 10 and 14 years. A total of 30% of the sample had worked at RU for more than 15 years. Time spent in academia in general also showed long career trajectories, with two-thirds of respondents having been in academia for more than 10 years. In terms of the currently held position at RU, about one-third of respondents were at the senior lecturer level at the time of the survey, while 19% were at the associate professor and 21% at the professor level. Nearly half (46%) of respondents were in the Science or Pharmacy faculties (86 people), 30% were in Humanities (57 people), with the remaining 24% being in the Law, Education, or Commerce faculties (44 people). There was no significant difference between the sample and the academic staff population characteristics in terms of gender. However, professors and associate professors were somewhat over-represented in the sample (41% compared to 33% in the staff population). Similarly, in terms of qualification the percentage of individuals with a PhD are over-represented in the sample (70% compared to 56%), and those with lower qualifications are somewhat under-represented, although it is also recognized that staff with PhDs are more likely to engage in research than those without and are able to supervise PhD students which contribute to their research activities.

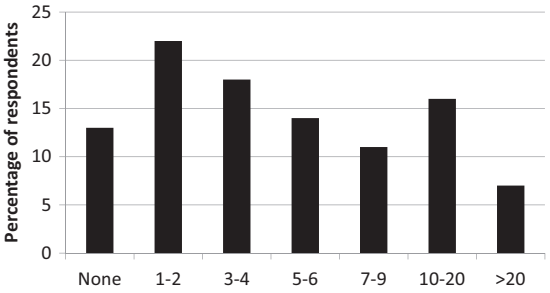

Figure 1. Number of subsidy earning outputs produced in the past 3 years.

About half of respondents (93 people) classified themselves as 'Emerging' researchers, 35% as 'Established', 9% as 'Advanced', and 6% said that they did not produce research. When compared to the number of self-reported, accredited, research outputs in the past 3 years, a clear pattern emerges (Table 1). The average number of accredited outputs in the past 3 years increases across the categories: 4.6 for Emerging researchers, 9.7 for Established, and 28 for Advanced. Similarly, the percentage who regard publishing in peer-reviewed journals as 'very important' increases from 68% for Emerging researchers to 75% for Established researchers and 81% for the Advanced category. The percentage who regard their research output as 'above average' relative to other academics at their stage of career in their discipline increases from 17% for Emerging to 40% for Established, and 56% for Advanced. In general then, the self-classification seems to be well explained by both absolute measures of output as well as relative output.

4.2 Research outputs

Respondents were asked how many accredited research outputs (papers, books, book chapters, accredited conference proceedings) they had authored or co-authored in the past 3 years. For the whole sample, the average number over the 3-year period was 7.5, about 2.5 outputs per year. The majority of respondents (87%) had produced at least one accredited output in the past 3 years (Fig. 1). Of these, the largest group (22%) had produced 1 or 2 outputs, followed by those who had produced 3 or 4 outputs (18%). A small group (7% of the sample, or 13 people) had produced more than 20 outputs (the average number of outputs for this group being 42).

There was marked variation across faculties in this regard (Table 2). The number of accredited outputs was highest in the Science and Pharmacy faculties, corresponding to their feeling that publication was important for their career goals and aspirations. However, it was pointed out by several respondents that not all departments and disciplines should be measured by the same stick, as some are less suited to accredited outputs (such as fine art) or produce professional degrees where there is limited demand for postgraduate degrees (e.g. law); 'research managers must understand not only research in general, but also the nature of research in different departments or disciplines'.

About three quarters of respondents (76%) had produced non-accredited outputs (such as consultancy reports, media articles, textbooks, art exhibitions, performances, compositions, publication

Table 2. Accredited research outputs and desire to publish more by faculty

Variable	Humanities (n = 57)	Science and pharmacy (n = 86)	Law, Education, and Commerce (n = 44)
Percentage with >0 accredited papers	93	87	80
Average number of accredited papers in the past 3 years	4.0	11.6	4.3
Percentage who wish to publish more	95	88	89
Percentage who consider publishing in peer-reviewed journals as 'very important' for their career goals and aspirations	60	81	59

Table 3. Supervision of postgraduate students

Supervision/co-supervision category	% who have supervised in the past 3 years	Average number supervised in past 3 years	Number of respondents
Honours	70	6.95	134
Masters	69	4.22	131
PhD	33	2.87	63

in non-accredited journals) during the previous 3 years. The average number of non-accredited outputs was 7.5 over the past 3 years. Across faculties, 81% of Humanities faculty members had produced non-accredited outputs, compared to 25% in the Law, Education, and Commerce faculties, and 9% in the Science and Pharmacy faculties.

4.3 Postgraduate supervision

Respondents were asked firstly if they had supervised postgraduate students at various levels, and if yes, how many students in the past 3 years (Table 3). The majority of respondents had supervised Honours and Masters level postgraduates within the preceding 3 years (70 and 69%, respectively). For those who had, the numbers for Honours students averaged nearly seven students, or slightly more than two per year. Corresponding numbers for Masters were lower, with an average of four students, or 1.3 per year. For those supervising PhDs, the average was nearly 1 per year. However, only one-third of respondents had supervised or co-supervised a PhD in the past 3 years.

Supervision at Masters and PhD levels was correlated with the self-rated stage of research career (Table 4). For Emerging researchers, 60% had supervised or co-supervised a Masters student in the past 3 years, but the vast majority had not supervised a PhD student, possibly because many of them were still focused on attaining their own PhD qualification or seeking funding for postgraduates. Amongst Established researchers, just more than half (55%) had supervised Masters students, while 87% of Advanced researchers had done so. While Emerging researchers had supervised about the same number of Masters students as Advanced researchers, the latter had about double the number of PhDs.

Table 4. Supervision of Masters and PhD students by stage of research career

	Emerging	Established	Advanced
Percentage who have supervised Masters (%)	60	83	100
For those who have supervised Masters, average number over 3 years	2.9	5.2	5.0
Percentage who have supervised PhD (%)	14	55	87
For those who have supervised PhD, average number over 3 years	2.0	2.6	4.4

4.4 Teaching, community engagement, and administration

The questionnaire explored various aspects of other responsibilities that most South African academics are expected to engage in, because these demand time, against which research time needs to be balanced. Total 44% (83 people) reported being actively involved in community engagement (CE). The average percentage of their time spent on CE was 27%, but with a lot of variation (SD of 10%). There was not much variation between respondents at different stages of their research career (45–50% across all three groups) or by faculty (Humanities—40%; Science and Pharmacy—43%, and Law, Education, and Commerce—50%).

Assuming that all academic staff are to some degree involved in leadership, management, and administration (LMA), the survey asked what percentage of their time was spent on these activities. Most respondents (89%) answered the question and the average amount of time spent on LMA was 30%. Nearly half of the respondents (47%) reported spending up to a fifth (20%) of their time on LMA; a further 45% spent between 25 and 50% of their time on LMA, with a small minority (8%) spending more than half their time on LMA.

In terms of time allocation, the survey also asked whether, in the opinion of the respondents, their department has a 'satisfactory load balancing mechanism that takes research productivity and postgraduate supervision loads into account, when allocating teaching, community engagement and administrative duties'. Only one-third of respondents agreed with this statement, while the majority (52%) disagreed and 15% were undecided. As expressed by one 'Rhodes' teaching culture tends to overpower the need for a research culture'. It was stated by more than one respondent that their department emphatically refused to even discuss hours related to research and postgraduate supervision. Thus, many argued that those actively engaging in research effectively have '*more work*' than those who do not (with only self-esteem and satisfaction as the reward). It was even observed that those with no or little research or few postgraduates generally have the undergraduate university vacations periods 'off', whereas those with consuming research projects and postgraduates do not get such breaks.

Differences were evident across faculties and career stages (Fig. 2). Emerging researchers were the least satisfied, while Advanced researchers were the most satisfied. Across faculties, by far the greatest proportion of those in Law, Education, and Commerce are dissatisfied with the absence of any load-bearing

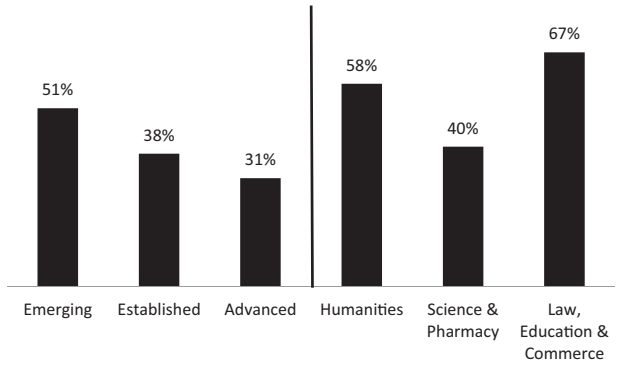

Figure 2. Percentage who regard departmental workload balancing mechanisms as unsatisfactory.

allocation, while Science and Pharmacy are more satisfied. Emerging researchers had the lowest average number of accredited papers, and those from the Law, Education, and Commerce faculties, who have the largest percentage of Emerging researchers, were the most dissatisfied with work load allocation, perhaps providing support for this finding.

4.5 Factors that enable research

For those who had produced some subsidy-earning research outputs in the past 3 years (174 respondents), the survey asked what factors had enabled them to do so. By far the most frequently chosen enabling factor (60%) was self-motivation and interest (Table 5). For example, one respondent wrote 'I'm driven to publish more because I want to'. Self-confidence was also listed as an important enabling factor by 28% of respondents. The second most frequently cited enabler was funding (37%). Outputs resulting from the supervision of postgraduate students were cited by 32% of respondents as an enabling factor.

Factors that create time for research were also important, such as personal time management (35%), *ad hoc* writing getaways with colleagues (30%), sabbatical (21%), personally designated writing days (21%), and low or manageable teaching loads (18%). The importance of connections with other researchers were also citied frequently in factors, such as participation in national conferences (33%), networking with fellow scholars and critical readers (24%), participation in multi-institutional research projects (20%), and feedback from other researchers (17%). Extrinsic motivation, such as a desire for promotion, was cited as an enabler by 18% of respondents.

For Emerging researchers, the most important factor was self-motivation and interest (49%), followed by participation in national conferences and writing getaways (31% each). A factor identified more often by Emerging researchers than other groups was the importance of mentors and role models (22%). For Established researchers, after self-motivation and interest (69%), the most important factors were to do with making time for research through their own time management (48%) and writing getaways (45%). A factor cited more frequently by this group was the importance of departmental and faculty support (18%). Being cognizant of the small sample size (16 people) for Advanced researchers, the enablers in this group nevertheless showed some differences compared to others. Much higher proportions of Advanced researchers identified self-motivation (81%) and their own time management strategies (75%) as research enablers, followed by national conferences (75%) and postgraduate supervision (63%).

Table 5. Research enablers by stage of research career (% in each group who chose this option)

Research enablers	All (%)	Emerging (%)	Established (%)	Advanced (%)
Self-motivation and interest	60	49	69	81
Funding	37	26	43	75
Own time management	35	25	45	56
National conferences	33	31	25	75
Supervision	32	19	48	44
Writing getaways	30	31	32	19
Self-confidence	28	25	34	25
Networking	24	19	26	44
Sabbatical	21	16	26	31
Personal writing days	21	24	18	13
Multi-institutional research projects	20	10	25	63
Low teaching loads	18	18	12	44
Desire for promotion	18	23	17	0
Feedback from other researchers	17	18	14	19
International conferences	15	11	18	25
Mentors and role models	14	22	8	0
Admin support	13	10	15	19
Departmental/faculty support	13	15	11	6
Departmental writing days	5	5	3	6
Formal training	3	1	0	31

Table 6. Most frequently cited research enablers by faculty

Enabler	Humanities (%)	Science and Pharmacy (%)	Law, Education, and Commerce (%)
Self-motivation	58	62	45
Time management	44	36	16
Self-confidence	37	24	18
Funding	33	44	18
National conferences	28	20	34
Getaways	28	28	34
Supervision	19	43	23
International conferences	18	7	27

Disaggregating the results by faculty shows some clear patterns (Table 6). For example, personal time management strategies are chosen much more often by those in the Humanities and Science and Pharmacy faculties, while attendance at national conferences and writing getaways were more important in the Law, Education, and Commerce faculties. Supervision of postgraduate students was chosen more often by members of the Science and Pharmacy faculties, while participation in international conferences was more important in the other faculties than in the sciences.

4.6 Factors constraining research

For those who wished to publish more (90% of the total sample), the questionnaire explored what factors were preventing this. The constraining factor most often identified (by 80% of respondents) was insufficient time (Fig. 3). This implies that while research can be

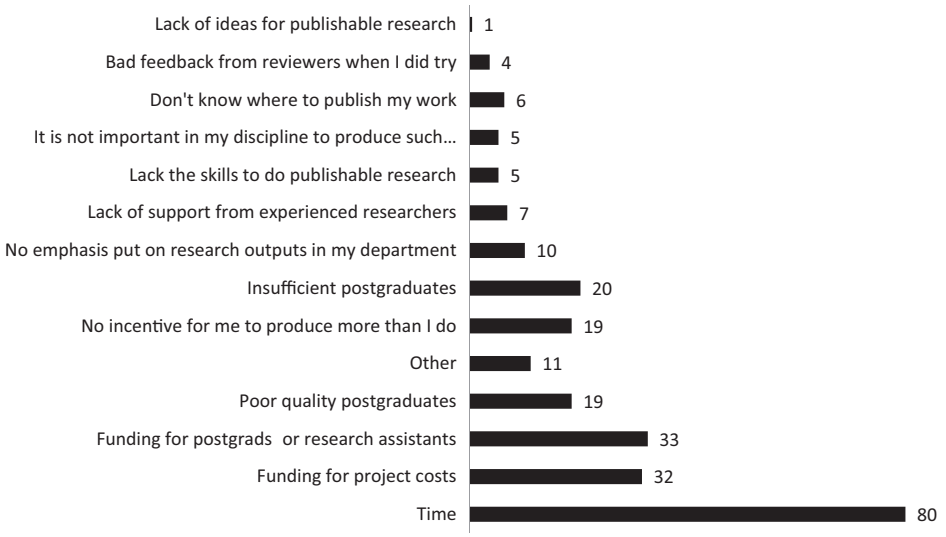

Figure 3. Factors constraining research outputs (percentage of the total sample).

complementary to other academic activities, like teaching, it can also compete. The most common comment in the open section and the FGDs was an iteration of this result, namely, most staff find it difficult to find sufficient and sustained quality time for research, as embodied in these quotes 'I feel I am likely to be an outstanding example of somebody who is passionate about research but almost never has enough time to produce it; this is in fact one of the greatest frustrations of my working life' and 'I can't be a subsidy-earning, research-generating machine too'. This was due to all the other demands on staff time (marking was emphasized as a large, unacknowledged consumer of time in small departments with large undergraduate numbers; 'I spend more hours per year on marking than I do on teaching, supervision, research or teaching') and the need to be active across all spheres. It was observed that a lack of quality time should not be conflated with a lack of time per se, both of which were frequently commented upon. It was emphasized that writing a quality research paper cannot be slotted into an hour a day here and there. But many found it hard to find blocks of quality time because of the multiple demands of teaching, staff meetings, administrative demands, course coordination (even if not teaching for a few weeks), marking, and emails.

Several respondents wrote quite emotionally about recognizing the need to find more time and to use it productively for completing their own PhD or writing up research. Whilst recognizing the need, most felt quite overwhelmed by the multiple demands on their time and were unclear how they were going to actually find the time or felt powerless to negotiate for more time within their departments or balance it with responsibilities at home. It was clear that they felt trapped.

Some mentioned that although they do undertake research and have good outputs, they find management of research and research funds both onerous and taking up more time than it should ('At one point I was spending up to 50% or more of my time on research management instead of writing up of the research'). This relates to forms, budgets, and reports for postgraduates, funders, and RU itself. It was opined that this could be the role of efficient and sufficiently senior administrative staff (potentially one shared between departments or cognate research disciplines).

The next most commonly identified constraints were related to funding, either for postgraduate students or research assistants (33%) or for research project costs (32%). The fourth and fifth most commonly identified constraints were related to the insufficient quantity of postgraduate students (20%) or to the perceived poor quality of postgraduate students (19%). Both these factors demonstrate the potentially complementary relationship between postgraduate supervision and research, but only if postgraduate outputs are of a sufficient quality to be publishable. Quality of postgraduates was linked to government pressure across the higher education sector in South Africa to enrol more postgraduates, which at times included those some how were not yet ready for postgraduate studies or whose English language proficiency was lacking. This added to the time required in supervision and commenting on draft chapters and theses.

Last were some institutional factors. These included a lack of incentive to publish more, the small size of their department which meant a lack of critical mass or opportunities for collaboration in specific research areas. Some who were in a department with no or limited research culture wrote about becoming demotivated because of some colleagues who resented or undervalued their attempts to develop a research profile. Some respondents felt such alienation so strongly that they mentioned that it was one of the reasons they were seeking alternative employment.

In the open section of the survey, multiple respondents wrote that there was insufficient institutional support or too much bureaucracy in terms of research administration and management. There was some commentary that the increase in student numbers was not being matched by increases in staff posts, whilst simultaneously the rate of increase in academic posts in the institution was perceived to be a lot less than the increase in administrative ones. This was then presented as one of the underlying reasons for less time for research.

Disaggregating the results by stage of research career indicated that while time constraints are an important factor in every category, they are particularly binding for Emerging and Established researchers (Table 7). The lack of funding for postgraduate students and research assistants was most often identified as a constraint by Established researchers, whereas Advanced researchers noted a lack of funding for research projects. The lack of postgraduate students

Table 7. Top six most commonly chosen research constraints by stage of research career

Constraining factor	Emerging (%)	Established (%)	Advanced (%)	Do not publish (%)
Insufficient time	82	83	69	67
Insufficient funding for postgraduate bursaries	32	38	31	8
Insufficient funding for projects	32	31	44	17
Too few postgraduates	25	17	6	25
Poor quality of postgraduates	16	22	31	8
No incentives provided for publishing	16	20	13	42

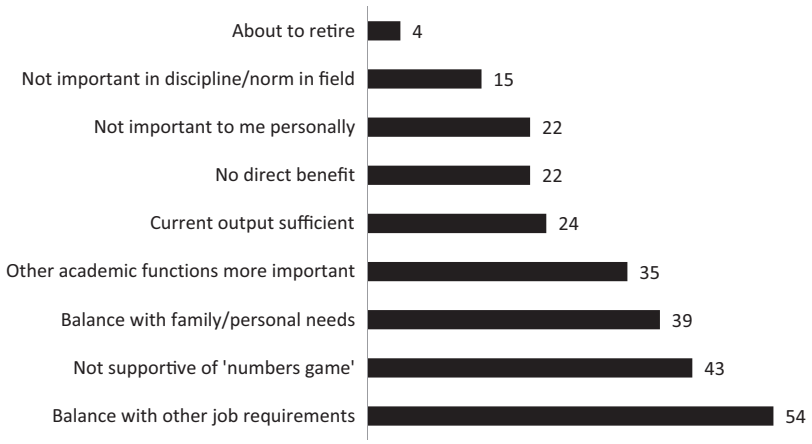

Figure 4. Reasons for not wanting to produce more research (percentage in each category).

was identified most often by those who do not publish and by Emerging researchers, while poor postgraduate quality was most often identified by Advanced researchers. For those who do not publish, the most commonly identified constraints, after lack of time, were the lack of incentives to produce, insufficient postgraduate students, and lack of funding for project costs.

For the whole sample, 60% of respondents listed lack of time as the first most important factor constraining their research output, followed by limited funding for projects, and then funding for postgraduate students and research assistants. There was very little variation amongst faculties, with insufficient time highlighted by all. Research project funding, along with postgraduate funding, was the most frequently cited constraint in the Science and Pharmacy faculties.

Overall then, research constraints seem to fall into four distinct categories (1) time constraints, (2) funding and postgraduates and project costs, (3) the poor quality of postgraduate students, and (4) institutional factors, such as a lack of incentives, no emphasis being put on research at departmental level, and lack of support from senior researchers.

For the relatively small number of people (46 responses) who did not want to produce more research, the main reason was because they would not be able to balance more research with the other requirements of their job (54%) (Fig. 4), again pointing to the trade-off between research time and time spent on other activities. A relatively high percentage (43%) of those who do not want to produce more research felt that way because they were 'not supportive of the numbers game of counting research outputs'. Needing to make time for personal and family needs (39%) and other academic functions, such as teaching, CE, and LMA (35%) were also cited. Another group of reasons spoke to the motivation for research: the belief that their current output was sufficient (24%), that they received no direct benefit (22%), or that they did not regard increasing research output as important to them personally (22%).

4.7 Determinants of research output

Table 8 presents the results of the full OLS statistical model to investigate the determinants of the number of accredited research outputs. The assumptions of the OLS method prevent the inclusion of variables that are highly correlated with each other, as this leads to biased results. For example, the number of accredited research outputs was correlated (0.42) with respondents who reported that they 'regularly' published with postgraduate students. However, regular postgraduate publishing was also highly correlated (0.54) with those in the Science and Pharmacy Faulty and with respondents who already had a PhD (0.42). Similarly, there was a strong negative correlation (−0.7) between respondents who had a PhD and who enjoyed teaching most; a positive correlation between those who indicated self-confidence, and those who indicated time management as research enablers (0.42); and between PhD supervision and conference attendance (0.55). In all these cases, only one of the variables in each set could be included in the model. This does not mean that the excluded variables are not important, but rather that the included variables represent the group. Sometimes, correlations could be dealt with by creating a composite variable: for example, attendance at national and international conferences was highly correlated (0.7), so a composite variable was created which added together the number of national and international conferences. To deal with the correlation between respondents having a PhD and PhD supervision/co-supervision, a composite supervision variable,

Table 8. The impact of respondent characteristics and enabling and constraining factors on research output during the study period

Variable	Variable description	Coefficient
Dependent variable	Number of subsidy earning papers/books/chapters/accredited conference proceedings (single or co-author) in past 3 years (2012–14)	
Constant	Value of dependent variable when all others = 0	−5.264801**
Sabbatical	1 if respondent had sabbatical since 2010; 0 otherwise	−2.234144
Non-accredited outputs	Number of non-accredited research outputs produced in past 3 years	−0.048739
Teaching80	1 if respondent reported having more than 80 contact sessions of teaching per year	−0.079440
Supervision	Number of Honours, Masters and PhD students supervised or co-supervised during the study period.	0.316650***
Conferences	Number of national and international conferences attended in study period	1.164932***
Community engagement	Percentage of time spent on CE projects connected directly with teaching or research	4.980276
LMA	Percentage of work time spent on LMA	1.261719
Research limiter: time	1 if respondent indicated that time was a research limiting factor; 0 otherwise	−3.223134*
Research limiter: funds	1 if respondent indicated that funds were a research limiting factor; 0 otherwise	−0.385311
Research enabler: self-motivation/interest in doing research	1 if respondents indicated that self-motivation/interest in doing research as a research enabler; 0 otherwise	−0.746523
Research enabler: own strong time management	1 if respondents indicated their own strong time management as a research enabler; 0 otherwise	3.421891**
Years worked at RU	Number of years (in categories) worked at RU:1 = 0–4years; 2 = 5–9 years; 3 = 10–14 years; 4 = 15–19 years; 5 = 20+ years	1.425983***
Sex	Male = 1; female = 0	1.246810
PhD	1 if highest qualification is a PhD; 0 otherwise	0.520503
Faculty	1 if Science or Pharmacy Faculties; 0 otherwise	3.948656***
Adjusted R^2	0.525924	
F-statistic	14.75615***	
Durbin–Watson statistic	2.056014	

*Significant at the 10% level; **Significant at the 5% level; ***Significant at the 1% level.

which added together supervision of Honours, Masters, and PhD students, was created.

The model performed fairly well, explaining 53% of the variation in the number of accredited research outputs produced in the survey period. Interestingly, having had sabbatical in the past 6 years was not a statistically significant determinant of accredited research outputs. Similarly, there was statistically significant relationship between accredited and non-accredited research output production. Other activities, such as teaching (measured as a binary variable, where a 1 indicated those with more than 80 contact periods per year), the percentage of time spent on community engagement, and the percentage of time spent on leadership, management and administration did not have a statistically significant relationship with the production of accredited research outputs.

However, participation in national and international conference was a very significant determinant: attending one more conferences being associated with 1.2 more accredited outputs. Supervision of postgraduate students also had a statistically positive impact: one more postgraduate being associated with a 0.3 unit increase in accredited outputs.

In terms of factors that enabled or limited research, time availability was important: respondents who indicated that time was a research limiting factor produced, on average 3.2 accredited research outputs less over the 3-year period (significant at the 10% level). The only statistically significant research enabler was 'own strong time management' (significant at the 5% level): respondents who chose this option producing an average of 3.4 more accredited research outputs, when controlling for other variables in the model.

The number of years worked at RU had a positive and strongly significant (at the 1% level) impact on research output: a one category increase in years worked increased accredited research output by 1.4 units. Once all the other variables in the model were controlled for, having a PhD and gender was not significant variables. However, being in the Science or Pharmacy Faculties increased research output by an average of nearly 4 units (significant at the 1% level).

5. Discussion

Our research provides several important insights into the personal and institutional factors that promote or hinder academic research productivity in a South African university. Whilst much mirrors understandings emanating from the global north, there are subtle differences that deserve consideration. Additionally, the results indicate some marked differences between research career stage and disciplines, which have been little explored in previous literature.

The five most frequently reported factors constraining research amongst those respondents who wished to produce more were: (1) lack of time; (2) lack of funding for postgraduate students and research assistants; (3) lack of funding for project costs; (4) insufficient number of postgraduates; and (5) lack of personal incentive to produce more. These are very similar to the obstacles to research productivity reported among medical researchers in Saudi Arabia (Alghanim and Alhamali 2011). Not unsurprisingly, many of the reported enablers of research were the obverse of these constraints. Thus, the most commonly reported factors enabling research amongst those who had produced outputs during the past 3 years were: (1) self-motivation and interest; (2) funding; (3) good time management; (4) attendance at national conferences; and (5) postgraduate supervision.

5.1 Motivation

Being motivated about research was the most commonly reported enabler of research productivity, across all disciplines and career stages; yet it was not significant in the model. The choice of self-motivation as a research enabler was however statistically significantly correlated (at the 1% level, two-tailed test) with research outputs (0.19), as one would expect. However, when controlling for the other variables in the model, such as postgraduate supervision, conference attendance, time management, and years worked at RU, the self-motivation variable is not significant. It is likely that self-motivation influences some of the other variables (although it is not statistically significantly correlated with variables such as conference attendance or supervision). Self-motivation was statistically significantly related (at the 5% level, two-tailed test) to the choice time management as a research enabler (0.17). Our results thus suggest that other factors, such as postgraduate supervision, conference attendance, and time management may be more important in determining research output than self-motivation.

It is reasonable to assume that if an individual is motivated about research and sharing their findings then she/he will find means to address or mitigate other constraints that they may encounter, such as insufficient time, funds, or postgraduates, or find others to help address these constraints for them. Intrinsic motivation may be undermined if extrinsic factors are also not as supportive of researchers in a given context feel they should be, in which case they will compensate with alternative activities which can result in a decrease in research productivity (Horodnic and Zaiţ 2015). Interestingly, Horodnic and Zaiţ (2015) observe that there has been very little investigation of the links between motivation and research productivity, but rather that research has focused on one or the other, a perspective that echoes Ryan (2014).

Much previous work has shown that motivation is typically an essential ingredient in what drives researchers, across a diversity of disciplines and is generally the most important or amongst the top within any range of factors investigated (White et al. 2012; Wills et al. 2013; Ryan 2014; Horodnic and Zaiţ 2015; Paul et al. 2017). Moreover, several have argued that intrinsic factors such as recognition and the satisfaction of solving complex problems are more important than extrinsic ones, such as salary or workplace conditions. However, Ryan and Berbegal-Mirabent (2016) posit that it is a lot more complex than this binary trade-off and that rather there are a wide diversity of patterns of motivation, which will then require institutions and managers to offer an equal diversity of material and non-material incentives to promote or maintain motivation.

Our results show a marked shift in the identification of motivation as a key enabler across the three career stages. Emerging researchers were less likely to identify motivation as an enabler of research than were advanced researchers, with established researchers almost equidistant between these two. This clearly requires further investigation of the underlying causal patterns of this finding.

5.2 Time and time management

A lack of sufficient quality time was by far the most commonly mentioned constraint to researchers wishing to produce more, as well as those who had not produced any outputs in the previous 3 years, whilst good time management was regarded as one of the main enablers of research output. This was statistically significant in the model, with those respondents who mentioned time as a limiting factor having, on average, a lower accredited research output than those who did not. Similarly, those respondents who mentioned their own strong time management as an enabling factor had, on average, a higher accredited research output than those who did not.

Other studies (Boyer 1990; Binder et al. 2012) have found that there is a trade-off between time spent on research versus time spent on teaching, CE and leadership, and management and administration (LMA). Regression results in this model show that, when controlling for other variables in the model, the number of accredited research outputs is *not* statistically significantly related to the percentage of time spent on teaching, CE, or LMA. However, teaching more than 80 sessions a year is statistically significantly (5% level, two-tailed test) and negatively correlated with research output (−0.19) but becomes statistically insignificant in the regression model when other things are controlled for. What this indicates is that, at least at RU, there does not appear to be a trade-off between research outputs and other academic activities when the other variables in the model (such as time management, having a PhD, supervision, etc.) are controlled for.

However, the multiple demands on time were a pervasive sentiment across the qualitative research data. The sense of not being able to cope was palpable. This is not unique to our sample. For example the longitudinal survey of Barham et al. (2014) indicated an average decline of 10 h per week spent on research over the past 30 years from a sample of science faculty researchers from 52 universities in the USA. As teaching hours had remained more or less constant, they found that the decline was associated with increases in general administrative duties of researchers, increased administration of research grants themselves, and more hours spent in what the authors termed 'extension'. The decline in time spent on research was marked in both research-intensive institutions and non-research intensive ones. This was also noted by several respondents in our study, encapsulated in the following observation 'I was spending up to 50% or more of my time on research management instead of writing up of the research'.

The stark contrast of the quantitative model with the qualitative results is interesting. It may be because those who participated in the focus groups and/or provided qualitative feedback are a particular sub-sample of the group, that is those who feel strongly that there is a trade-off between research and other activities. It may also be because of the way the quantitative variables were measured (% of time for CE and LMA, and a binary variable for teaching), which may not have captured these complex relationships adequately. For example, in the focus groups, quality of time was also repeatedly highlighted as necessary for good research productivity. The planning of a research project or writing of a journal article, book chapter, or book requires researchers to be able to gather their thoughts and concentrate on what it is they wish to write. The analysis and creativity associated with much research need unadulterated periods of time, solid blocks of 4 or more hours. Yet for most, the multidimensional nature of academia means there are many other demands and also many unplanned interruptions, such as from students, colleagues, and emails, which can become very hard to ignore or manage (Chase et al. 2013). Some strategies already employed by some of the respondents in our study were designated, regular days for writing, such as 1 day a week or month, or every afternoon in which they had no teaching responsibilities or meetings, writing get-togethers, or writing from home rather than the office. Chase et al. (2013) argue that individual time management skills are an important prerequisite for research productivity, whilst White et al. (2012) found time

management skills a key differentiator between what they called 'research stars' in business schools and their colleagues with low research productivity. Given the importance of solid blocks of uninterrupted time, one would assume that having a sabbatical of 3–12 months would be a major boost to research productivity, but that was not a statistically significant determinant in our sample.

As with motivation, there were marked differences in consideration of insufficient time as a constraint and own time management as an enabler between the three career stages. A high proportion (82%) of Emerging researchers viewed lack of time as a constraint; yet only 25% viewed own time management as an enabler. At the opposite end, 69% of Advanced researchers mentioned insufficient time as a constraint, whilst 56% saw personal time management as an enabler. We speculate that this may be a reflection of (1) emerging researchers having higher teaching duties or spend more time in preparing for them because they are less confident in their knowledge set, and (2) advanced researchers having had longer time and experience to develop time management skills based on experience of what does or does not work for them.

With respect to management and division of time within departments, only 33% of respondents felt that their department had a satisfactory mechanism for attempting to balance workloads between staff. Most respondents felt that there was not a satisfactory mechanism and that in most departments the time demands of research (including postgraduate supervision) were not considered or debated when allocating roles and tasks to individual staff. As expressed by one 'Rhodes' teaching culture tends to overpower the need for a research culture'. Because teaching duties and often administrative meetings are scheduled for specific times and specific days, there was no flexibility, and hence, research activities, especially writing, had to be slotted in between. Because research has a degree of flexibility in when it can be done or written up, it loses status when allocations of time are discussed. Additionally, the total number of courses and lectures are known in advance and can be divided between the staff in a department according to some agreed mechanism, but involvement in research is frequently an individual activity with a wide range in number of hours per staff member. Fostering a more pervasive and 'formally' accepted research culture at departmental and faculty levels, especially in support of Emerging researchers, was seen as pivotal for widening and entrenching a research ethos. This would include some departmentally designed mechanism that accounts for and allocates research time, especially postgraduate supervision time, in a manner similar to teaching time.

The 'competition' for time is not solely between different spheres of academia, but also spills over into researchers' personal lives. Many of those who had not published in the study period attributed part of the reason to the need or desire to prioritize their families or personal interests. Given this, and the high demand for teaching, marking, administration, and the like, research productivity was sacrificed as the following quote illustrates 'I have two young children and this has reduced my productivity over the last years since I seldom write or do work outside of working hours'. Jacobs and Winslow (2004) reveal the tension between family commitments and the career advancement based on research outputs, with many researchers and academics averaging 50-h working weeks. Additionally some studies indicate that these conflicts are higher amongst women with children (Hunter and Leahey 2010), which translates into lower research productivity, although this is not universal (Duffy et al. 2011). Claessens et al. (2007) argue that effective time management is not important solely for work place productivity, but it also results in lower stress and improved job satisfaction which also benefit time and mood in the home space.

One of the strongest findings of these results is thus that time management is extremely important in determining research outputs—more so than almost anything else in the model. It is statistically significantly positively correlated with self-motivation, supervision, having a PhD and being an established or advanced researcher. It is negatively correlated with being an emerging researcher (−0.175; significant at 5% level). This last result is concerning, since it suggests that emerging researchers have yet to learn the importance of time management skills for their research careers, and also have some clear policy implications: that running time management workshops, sharing time management skills, and creating quality writing time in departments will have a positive impact on all researchers but may be especially important for emerging researchers.

5.3 Supervision of postgraduates

Supervision of postgraduate students (Honours, Masters, and PhD) is regarded by some academics, especially those in the natural sciences, as part of research, which can potentially lead to increased output through joint publications. On the other hand, supervision can be a time-consuming process which, depending on the quality of the work produced and the availability of time and motivation to rework a thesis into a publishable product, may detract, rather than add, to research outputs. Just over one-third (35%) of our sample reported that they published regularly with postgraduate students. Reasons for it not being higher included (1) disciplinary norms, (2) perceived poor postgraduate quality, and (3) after completion, postgraduates seek employment and so there is no incentive for them to publish. However, overall, there was a statistically positive relationship between postgraduate supervision and research productivity.

It is acknowledged that there are disciplinary differences between the natural sciences and the humanities and social sciences when it comes to knowledge creation and publishing (Muller 2008). However, it is also important to acknowledge the differences in supervision models. In her review, Obers (2013) finds evidence that the hierarchical knowledge structures and conceptual consensus in the natural sciences make collaborative work in these fields much more common than in the humanities. In the humanities and social sciences, research is often conducted by an individual, rather than a team, and knowledge creation can take a number of different methodological approaches. These disciplinary differences are also apparent when it comes to the supervision of postgraduate students. While supervision in the natural sciences often happens in groups (albeit not exclusively so), supervision in the humanities and social sciences is more likely to be individual and is sometimes outside the specific field of expertise of the supervisor (Obers 2013).

Hakkarainen et al. (2016) contrast the main features of the individual model (IM) of supervision, frequently used in the humanities and social sciences, with those of the collective model (CM), usually used in the natural sciences. The IM focuses the personally identified research questions of the student; outputs are often single-authored papers or monographs; and the supervision model emphasizes the personal relationship between supervisor and student. The CM focuses on collective research questions, clearly related to the field of the supervisor; outputs consist of co-authored journal articles; and the supervision model is very much embedded in the collective knowledge of the research group (Hakkarainen et al. 2016).

Hakkarainen et al. (2016) argue that some features of the CM can be extended from the natural sciences into the humanities and social sciences (their case study was in the education faculty), despite acknowledging significant differences between them.

Disciplinary differences are thus likely to explain the observed patterns of both publication rates and publishing with postgraduate students found in this research, although the variable remained positive and significant, even when being in the Science Faculty was controlled for. They also explain the differences in the view that, on the one hand, supervision of postgraduates is an important research enabler, especially in the natural and medical sciences (Alghanim and Alhamali 2011), while others felt that supervision loads reduced the time for their own research, most noticeably in the humanities and social sciences. Indeed, Dundar and Lewis (1998) reported that engagement in postgraduate supervision was statistically positively related to the research productivity in the natural sciences, but for the social sciences, it was slightly negative.

Not unexpectedly differences were also apparent across career stages with respect to mentioning postgraduate supervision as an enabler of research. Only 19% of Emerging researchers mentioned it, whereas 48 and 44% of Established and Advanced researchers, respectively, did so. This can be ascribed to Emerging researchers generally having far less experience of supervising postgraduates and fewer of them relative to either Established or Advanced researchers. This is because some of the Emerging researchers were still working on their own postgraduate degree, usually a PhD, which limited their time and eligibility to supervise other postgraduates. If most Emerging researchers have not yet supervised a PhD student, and supervised approximately half the number of Masters postgraduates that Advanced researchers do, they will therefore have had fewer opportunities to publish with postgraduates and hence not view them as an enabling factor. In contrast, for some Advanced and Established researchers, especially in the natural sciences, more than 80% of their publications come from postgraduate supervision.

5.4 Not all want to produce more

Whilst the overwhelming majority of respondents stated that they did wish to produce more research outputs, about 10% said they did not want to. The four most frequently cited reasons were: (1) the need to balance research with other requirements; (2) that they were not supportive of the 'numbers game'; (3) that they needed to balance work with family or personal needs; and (4) that they regarded other academic functions as more important.

6. Conclusion

This study has added to understandings of the factors that promote or undermine research productivity by examining a case from a global south institution. Although the macro-context was different to much of the previous literature, many of the findings echoed previous work, which suggests that macro-context might not be particularly important. However, we acknowledge that RU is regarded as a research-intensive university and therefore might not be a representative case study of many global south institutions. Within this setting our results also reveal disciplinary and career stage differences. Disciplinary differences have been the focus of previous research, but career stage less so, and consequently, our results pose important questions to understanding the underlying causes of the differences as well as the policy and practical implications for research institutions. Indeed, considering both disciplines and career stage together results in a diversity of groups each of which is characterized by different weightings of the enablers and constraints. This suggests the need for a formal cluster analysis to develop a typology of researchers which could then allow for more nuanced and targeted interventions to help support their research endeavours. However, this is not possible with the small sample size (especially of Advanced researchers), and such an analysis would also benefit from having several institutions in the sample. As with Ryan and Berbegal-Mirabent's (2016) analysis of the diversity of patterns of motivation, it is imperative that researchers and managers in this field recognize and consequently seek ways to accommodate the variety of contexts, factors, and types of researchers in which they are interested and the complexity that arises from the combination of these different considerations. Indeed, this was a common lament or suggestion, that even within RU itself greater recognition is required of this diversity and therefore greater differentiation is required in the type, magnitude, and frequency of research support offered across career and life stages and faculties, i.e. on size does not fit all, and it is unrealistic to ever assume it would.

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References

Alghanim, S. A., and Alhamali, R. M. (2011) 'Research Productivity among Faculty Members at Medical and Health Schools in Saudi Arabia: Prevalence, Obstacles and Associated Factors', *Saudi Medical Journal*, 32: 1297–303.

Andersen, L., and Pallensen, T. (2008) 'Not Just for the Money? How Financial Incentives Affect the Number of Publications at Danish Research Institutions', *International Public Management Journal*, 11: 28–47.

Artés, J., Pedraja-Chaparro, F., and Salinas-Jiménez, M. (2017) 'Research Performance and Teaching Quality in the Spanish Higher Education System: Evidence from a Medium-Sized University', *Research Policy*, 46: 19–29.

Barham, B. L., Foltz, J. D., and Prager, D. L. (2014) 'Making Time for Science', *Research Policy*, 43: 21–31.

Baskurt, O. K. (2011) 'Time Series Analysis of Publication Counts of a University: What Are the Implications?', *Scientometrics*, 86: 645–56.

Binder, M. et al. (2012) 'The Teaching Penalty in Higher Education: Evidence from a Public Research University', *Economic Letters*, 117: 39–41.

Boyer, E. (1990) *Scholarship Reconsidered: Priorities for the Professoriate*. Carnegie Foundation for the Advancement of Teaching. <https://files.eric.ed.gov/fulltext/ED326149.pdf> accessed 9 Dec 2015.

Braun, V., and Clarke, V. (2006) 'Using Thematic Analysis in Psychology', *Qualitative Research in Psychology*, 3: 77–101.

Butler, L. (2003) 'Explaining Australia's Increased Share of ISI Publication – the Effects of a Funding Formula Based on Publication Counts', *Research Policy*, 32: 143–55.

Chase, J.-A. D. et al. (2013) 'Time Management Strategies for Research Productivity', *Western Journal of Nursing Research*, 35: 155–76.

Claessens, B. J., van Eerde, W., and Rutte, C. G. (2007) 'A Review of the Time Management Literature', *Personnel Review*, 36: 255–76.

Duffy, R. D. et al. (2011) 'The Research Productivity of Academic Psychologists: Assessment, Trends, and Best Practice Recommendations', *Scientometrics*, 89: 207–27.

Dundar, H., and Lewis, D. R. (1998) 'Determinants of Research Productivity in Higher Education', *Research in Higher Education*, 3: 607–31.

Freeman, C. (2002) 'Continental, National and Sub-National Innovation Systems—Complementarity and Economic Growth', *Research Policy*, 31: 191–211.

Frey, B., and Jegen, R. (2001) 'Motivational Crowding Theory', *Journal of Economic Surveys*, 15: 589–611.

Hakkarainen, K. et al. (2016) 'Extending Collective Practices of Doctoral Education from Natural to Educational Sciences', *Studies in Higher Education*, 41: 63–78.

Heinze, T. et al. (2009) 'Organizational and Institutional Influences on Creativity in Scientific Research', *Research Policy*, 38: 610–23.

Horodnic, I. A., and Zaiţ, A. (2015) 'Motivation and Research Productivity in a University Systems Undergoing Transition', *Research Education*, 24: 282–92.

Hunter, L. A., and Leahey, E. (2010) 'Parenting and Research Productivity: New Evidence and Methods', *Social Studies of Science*, 40: 433–51.

Jacobs, J. A., and Winslow, S. E. (2004) 'Overworked Faculty: Job Stresses and Family Demands', *Annals of the American Academy of Political and Social Science*, 596: 104–29.

Lam, A. (2011) 'What Motivates Academic Scientists to Engage in Research Commercialization: 'Gold', 'Ribbon', or 'Puzzle'?', *Research Policy*, 40: 1354–68.

Muller, J. (2008) *In Search of Coherence: A Conceptual Guide to Curriculum Planning for Comprehensive Universities*. Report prepared for the SANTED Project, Centre for Education Policy Development, Port Elizabeth, Nelson Mandela Metropolitan University.

Muller, R., and de Rijcke, S. (2017) 'Exploring the Epistemic Impact of Academic Performance Indicators in the Life Sciences', *Research Evaluation*, 26/3: 157–68.

Obers, N. (2013). 'A Case Study of the Research Careers of Women Academics: Constraints and Enablements', Masters thesis, Rhodes University, Grahamstown.

Paradeise, C., and Thoenig, J. (2013) 'Academic Institutions in Search of Quality: Local Orders and Global Standards', *Organization Studies*, 34 /2: 189–218.

Paul, S. et al. (2017) 'Determinants of Research Productivity of Agricultural Scientists: Implications for the National Agricultural Research and Education System of India', *Current Science*, 112: 252–7.

Ryan, J. C. (2014) 'The Work Motivation of Research Scientists and Its Effect on Work Performance', *R&D Management*, 44: 355–68.

Ryan, J. C., and Berbegal-Mirabent, J. (2016) 'Motivational Recipes and Research Performance: A Fuzzy Set Analysis of the Motional Profile of High Performing Research Scientists', *Journal of Business Research*, 69: 5299–304.

Thoenig, J., and Paradeise, C. (2016) 'Strategic Capacity and Organisational Capabilities: A Challenge for Universities', *Minerva*, 54: 293–324.

Toole, A. A. (2012) 'The Impact of Public Basic Research on Industrial Innovation: Evidence from the Pharmaceutical Industry', *Research Policy*, 41: 1–12.

Vaismoradi, M., Turunen, H., and Bondas, T. (2013) 'Content Analysis and Thematic Analysis: Implications for Conducting a Qualitative Descriptive Study', *Nursing and Health Sciences*, 15: 398–405.

White, C. S. et al. (2012) 'What Makes a "Research Star? Factors Influencing the Research Productivity of Business Faculty', *International Journal of Productivity and Performance Management*, 61: 584–602.

Wills, D., Ridley, G., and Mitev, H. (2013) 'Research Productivity of Accounting Academics in Changing and Challenging Times', *Journal of Accounting and Organizational Change*, 9: 4–25.