Intrinsic antecedents of academic research productivity of a large South African university

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A B S T R A C T

Across different contexts, the human resources literature suggests that a range of intrinsic factors – typically measured as psychographic, or intrinsic, variables – are antecedents of individual job performance. What is not clear from this literature, however, is the relative contribution of different dimensions of these factors to research output as a measure of individual job performance in the South African academic context. This research seeks to address this lack of knowledge. A large South African university was comprehensively sampled. Structural equation modelling was used to test a model of these relationships predicted by this body of theory. The findings contest certain predictions of seminal theory. This context is found to potentially be atypical of other work contexts. It is argued that certain theory and research findings might not all necessarily generalise into this context because (i) research productivity as a form of job performance may differ from other forms of job performance, and (ii) a cohort of academics may differ from other professional cohorts in other contexts. New insights into the antecedents of research productivity in this context are offered, and recommendations are made for how academics might increase their research productivity.

Key words: job performance, South Africa, research productivity, human resources management

Introduction

South Africa faces a host of challenges in its pursuit of research productivity (ASSAf 2010). Resource constraints, and the fact that only a third of permanent staff have

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doctorates in South African higher education institutions, are examples of these challenges (ASSAf 2010). One indicator of South Africa's research capacity in relation to other countries is its production of doctoral graduates; in 2007 it produced 26 graduates per million, which contrasts unfavourably with those produced by other countries (for example, 251 per million for Australia; 201 per million for the United States; 288 per million for the United Kingdom; and 297 per million for Germany) (ASSAf 2010). Notwithstanding these challenges, and a previous decline in its research outputs, by 2010 South Africa was ranked 33rd in the world for its research performance, and according to scientometric analysis, the country's research performance is on the increase (Pouris 2012). Given the importance of research productivity for a developing country such as South Africa (Pouris 2012), this research seeks to offer insights that might contribute to improvements in individual research productivity, as a dimension of the South African education system. Such insights are also important for researchers in other-country contexts, because they can indicate the extent to which job performance theory does generalise across different contexts. Within other contexts, there might be environments that are in certain ways similar to the context in which this study was conducted.

Research productivity is a function of a complex array of individual-level effects, which include intrinsic influences (for example, Dundar & Lewis 1998; Erdogan & Bauer 2005; Hara, Solomon, Kim & Sonnenwald 2003; Laursen & Foss 2003; Lucas 2006; Morton & Beard 2005; Rachal, Shelley & David 2008; Ramsden 1994; Rothausen-Vange, Marler & Wright 2005; Rynes, Bartunek & Daft 2001). There also seems to be general agreement across the job performance literature that psychological, or intrinsic, effects have a dominant role in driving individual job performance (Sani 2013; Piccoli, Setti, Filipi, Argentero & Bellotto 2013). Different forms of work tasks are not homogeneous, however (Hackman & Oldham 1976), and different forms of job performance can therefore have different antecedents. However, what is absent from this body of literature is a perspective of the relative generalisability of theory and empirical evidence from other contexts that predicts the intrinsic antecedents of research productivity.

This research seeks to address this deficiency, through the testing of a hypothesised model of intrinsic relationships in this context. This model represents relationships derived from the literature that are expected to generalise across most work contexts. This model is shown in Figure 1. According to the predictions of this model, positive affect (PA), negative affect (NA), self-efficacy, locus of control, job satisfaction and experience are considered to be primary, or dominant, causal variables that will also drive the research output of individual academics in this context. A discussion of this model follows in the next section.

What is seemingly absent from the job performance literature is an understanding of the extent to which academic research output, as a dimension of job performance in this context, is typical of other forms of job performance in other contexts. Drawing from theory that differentiates between task-focused and person-focused dimensions of work behaviour (Ho 2012; Raskin 1965), there are two ways in which the relationships around research productivity might differ.

Firstly, *task-related* differences may exist (Ho 2012; Raskin 1965). The production of research outputs might represent a form of specific human capital (Becker 1964), related to tacit learning, which may differ from other forms of job performance in other contexts. If so, it is possible that the intrinsic relationships around dimensions of job performance in other contexts may not necessarily generalise into this context.

Secondly, *person-related* cohort differences may exist (Ho 2012; Raskin 1965). The academic cohort, or professional academics as a career group, might differ from other professional groups. For instance, such a group might have a certain homogeneity associated with it, considering that a profession might select people with certain characteristics into the profession over time. Theory and previous research findings from other contexts, particularly from other general work contexts, might therefore not necessarily generalise into this context.

Using structural equation modelling, this research offers a test of this model and the specific direct and indirect relationships predicted by theory. In other words, this work provides a test of the generalisability of certain theory from the literature to this specific context. Having provided an overview of the article, the theory related to these relationships is discussed.

Discussion of the tested model

Following the primary dichotomisation of variance in the job performance literature according to task-related and person-related effects (Ho 2012; Raskin 1965), the model presented in Figure 1 reflects certain intrinsic factors to which the job performance literature accords prominence. The model is presented in this section, and the next section reviews the literature that underpins the model.

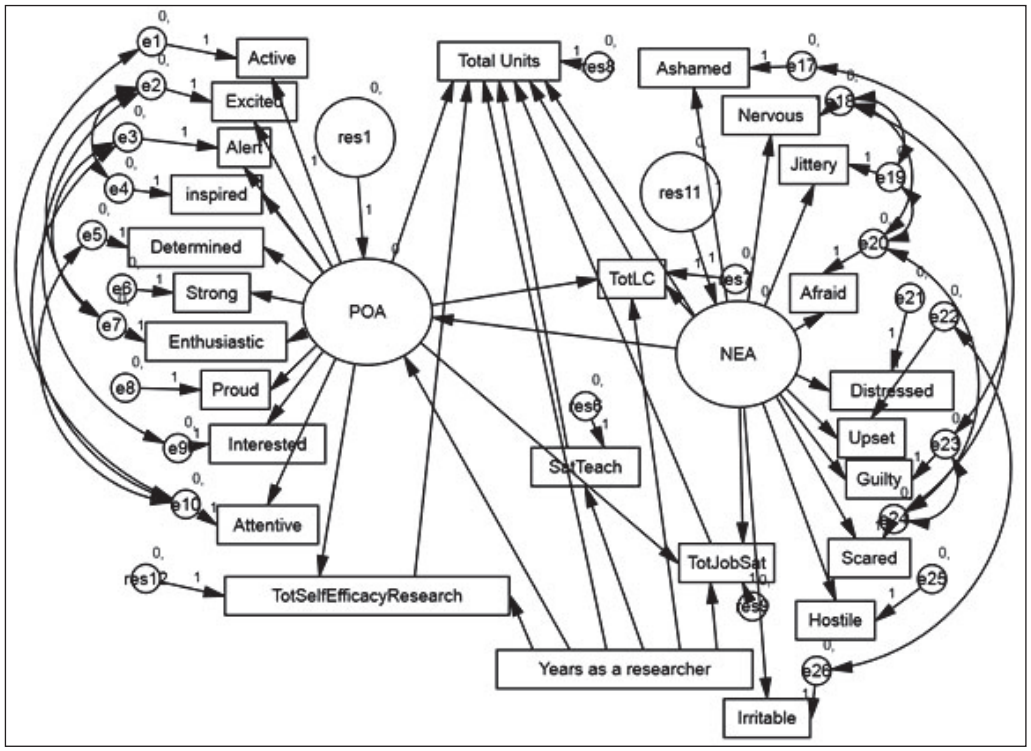
The dependent variable is shown in the diagram as 'total units', representing a summative measure of an individual's published journal articles, conference proceedings and book chapters, together with conference papers presented. As indicated above, this model is *specific* to research output as a dimension of job performance and also to a specific cohort of professional workers, namely academics. It is argued that this study has theoretical and practical importance as it argues that theory and empirical findings from other work contexts will not necessarily generalise

to this context, primarily due to differences along these two dimensions (task-related and person-related differences).

This model is therefore expected to offer a test of relationships derived from the job performance literature. However, not all these relationships are necessarily expected to be generalisable. This model is therefore considered to represent relationships that are derived from the literature (and are expected to generalise across most contexts). These relationships between factors related to job performance are tested with respect to their contribution to the research output of academics, as a dimension of job performance.

On the basis of the literature (Ho 2012; Raskin 1965), it is argued that a model, despite having its foundations in the literature, might not necessarily hold in this context because of context-specific differences that (i) relate to the *specific tasks* inherent in research productivity, which are expected to differ substantially from other dimensions of job performance in other contexts; and also that (ii) relate to a *specific professional cohort* of workers: academics, who might differ from other cohorts of workers in other contexts. As such, the theory and previous empirical findings that generalise across most work contexts (reflected in this tested model based on the literature that is reviewed in the following section) cannot therefore be assumed to generalise into this specific context, and cannot be assumed to necessarily predict job performance in the form of research productivity in this context. This model is therefore tested, and then an alternative exploratory model is offered of the structure of the associations that reflect the empirical data in this context (Byrne 2010). By doing so, this study provides a test of whether this model of job performance relationships predicted by the literature does indeed predict relationships around research productivity as a form of job performance in this context.

In the model, the role of negative and positive affectivity is accorded an important focus, because of the relatively large amount of literature that predicts affect to be a methodological bias variable (Podsakoff, MacKenzie, Lee & Podsakoff 2003). Affect is therefore explicitly included in the model. Furthermore, it is taken to be a dominant performance predictor in the job performance literature in its own right. Nevertheless, it is included in its measurement model form within the structural model tested in this study. Also included in this depiction of the model are the error terms, and the paths that were freed up (Byrne 2010) are shown here, in advance of the sections that further explain these fit adjustments. Figure 1 therefore shows the model tested statistically.



Note: NEA: negative affect; POA: positive affect; LC: locus of control

Figure 1: Initial proposed model (showing error terms and residuals) prior to the empirical testing of the structural model

Having introduced the tested model, the literature related to the theory and empirical findings that underpin the model is discussed.

Theory and hypotheses

Intrinsic influences on performance can be powerful motivational factors, as opposed to the weaker influence of extrinsic influences, or hygiene factors (Herzberg 1968). In the research context, professional awards and recognition for research contribute to intrinsic commitment for research (Young 2005), as do human resources management policies that offer extrinsic rewards (Hales, Shahrokh & Servis 2005). It is acknowledged that external, or contextual, factors can play a disruptive role in attempts to test associations between performance and intrinsic factors. This research will therefore only make claims based on the testing of 'net' relationships, or associations between intrinsic factors and performance. Taking contextual

influences as given, certain theory predicts that individual intrinsic differences can be associated with differences in individual job performance.

Positive affectivity, or affect, can contribute to job satisfaction, as a result of the fit between an individual and the stimulation received from task engagement (Watson, Clark & Tellegen 1988). Affect is an individual's mood, or emotional dispositional orientation (Watson & Clark 1984). Differences in individual endowments of affect can be associated with differences in individual behaviours (Watson & Clark 1984). Affect has a physiological basis, and can also act as a mediator of human behaviour; positive affect (PA) has been found to relate to positive stimuli, and negative affect (NA) to negative stimuli (Scott 1966).

This polar differentiation, between PA and NA, seems to be reflected in the correspondence between the two dimensions of affect and the two dimensions of the 'Big Five' personality model (Watson, Clark & Tellegen 1988). Positive affect corresponds with extraversion, and negative affect with neuroticism (Watson et al. 1988).

Individual differences in affect have been found to be associated with differences in work performance, through a range of different channels. Individual differences in affect have been found to be associated with individual differences in creativity (Bledow, Rosing & Frese 2013), job stress (Brief, Burke, George, Robinson & Webster 1988), ethical behaviours (Lowe & Reckers 2012), proactive work behaviours (Parker, Johnson, Collins & Nguyen 2013), cognitive memory processing (Storbeck 2013) and decision-making over and above the influence of cognition (Lowe & Reckers 2012). NA has also been found to have a substantive and negative influence on certain dimensions of work performance (Spector, Zapf, Chen & Frese 2000). Derived from this body of literature is hypothesis a, that *affectivity is significantly associated with research output*.

Self-efficacy, or the personal judgment of 'how well one can execute courses of action required to deal with prospective situations', has been described in certain instances as the dominant influence on an individual's task performance (Bandura 1982: 122). A general consensus across the self-efficacy literature supports Bandura's (1982) theoretical predictions: that self-efficacy is typically positively associated with different forms of task performance across different contexts (Bernadowski, Perry & Del Greco 2013; Briley 2012; Calik, Sezgin, Kavgaci & Kilinc 2012; Ghasemizad, Khajehei & Mohamadkhani 2013). Similarly, positive relationships between self-efficacy and job performance have also been found to be supported by meta-analysis findings (Stajkovic & Luthans 1998).

The relationship, however, between self-efficacy and research productivity is not certain; self-efficacy has less of an influence when tasks are higher in complexity

(Stajkovic & Luthans 1998), and research work might be considered complex work. Nevertheless, derived from this literature, hypothesis b is offered, that *self-efficacy is significantly associated with research output*.

Locus of control reflects the extent to which an individual generally perceives outcomes to be the result of his or her own efforts (an internal locus of control) or the result of circumstances beyond his or her control (an external locus of control) (Rotter 1966). Meta-analysis findings support the theoretically predicted positive relationships between internal locus of control and job performance, and between internal locus of control and job satisfaction (Judge & Bono 2001). Other studies have found relationships between internal locus of control and lower work anxiety as well as higher levels of job satisfaction (Spector & O'Connell 1994). Locus of control (internal) has also been found to be positively associated with organisational identification (Lee 2013), lower levels of stress (Khan, Saleem & Shahid 2012), intentions to stay in organisations (Ng & Butts 2009) and lower levels of anxiety and depression (Cheng, Shu-fai, Hin-man & Chan 2013). On the basis of these findings, which suggest that positive work effects are associated with internal locus of control, hypothesis c is therefore derived, that *locus of control is significantly associated with research output*.

Job satisfaction, or 'the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating one's job values' (Locke 1969: 317), can relate to job performance through certain causal mechanisms. For example, intrinsic investment in tasks can be withdrawn when job satisfaction reduces; this mechanism can operate at the individual level (Organ 1988) or at the level of groups (Organ 1997). Over time, certain empirical evidence has been found to support a positive relationship between job performance and job satisfaction, including meta-analysis findings (Judge, Thoresen, Bono & Patton 2001). Job satisfaction has also been found to be positively associated with higher firm value (Edmans 2012), and with lower levels of employee turnover (Liu, Mitchell, Lee, Holtom & Hinkin 2012). On the basis of this literature, hypothesis d is derived for testing, that *job satisfaction is significantly associated with research output*.

This relationship, however, has also been found to be contingent on other influences, for example person-organisation and person-job fit (Erdogan & Bauer 2005), fit between the individual and the stimulus provided by the task (Scott 1966), the nature of work tasks themselves (Hackman & Oldham 1976), and the degree to which work tasks in a job connect with intrinsic motivation (Herzberg 1968). A specific tension exists in academic contexts: the tension between teaching and research, as work roles (Hattie & Marsh 1996). As a further, and more specific, measure of satisfaction in this context, satisfaction with teaching is taken to represent

a dominant locus of satisfaction, and hypothesis e is therefore offered, *that satisfaction with teaching is significantly associated with research output*.

In the testing of these hypotheses, paths from years as a researcher though each of these tested variables to research productivity are also tested, in order to see what further contribution they make, over and above their direct influence on research productivity, which represents either specific or general human capital (Becker 1964). Specific human capital represents investments in learning associated with a job that are not generalisable across contexts; general human capital is the converse (Becker 1964). The test of this model is expected to indicate whether research output, as a form of job performance, is primarily associated with specific or general human capital effects. Having presented the theoretical relationships that underlie the tested model, the methods applied in this research are now considered.

Methodology

This study applies a cross-sectional exploratory research design, within the paradigm of post-positivism (Cresswell 2003).

Participants

The sampling frame of the study comprised all the academic staff of a large South African research university, comprising about 1 300 full-time and part-time academics. A comprehensive purposive sampling process was applied. The entire institution was sampled, and 225 usable responses were obtained. Respondents were able to return questionnaires (in pre-addressed envelopes) through the university's internal mail system. The instrument was comprised of different sections; biographical data were sampled in a separate section from psychographic items. The response rate was approximately 17%. A sample size calculation indicated that sufficient statistical power was present for inferential interpretations to be made based on this sample size if the five per cent level of significance was used. In order to further check the representativeness of the sample, the ratios were calculated, of staff (i) without doctorates (Mr and Ms classifications), (ii) those with doctorates but not yet at the professorial rank, (iii) associate professors and (iv) professors. Staff without doctorates made up 46% of the sample, those with doctorates 31.7%, those at associate professor level 13.8%, and those at professorial level 8%. This provided a ratio of 5.75:3.96:1.7:1. This ratio was taken to be broadly representative of the population. The prescriptions of the institution's Ethics Committee were faithfully followed.

Scales, measures and data analysis

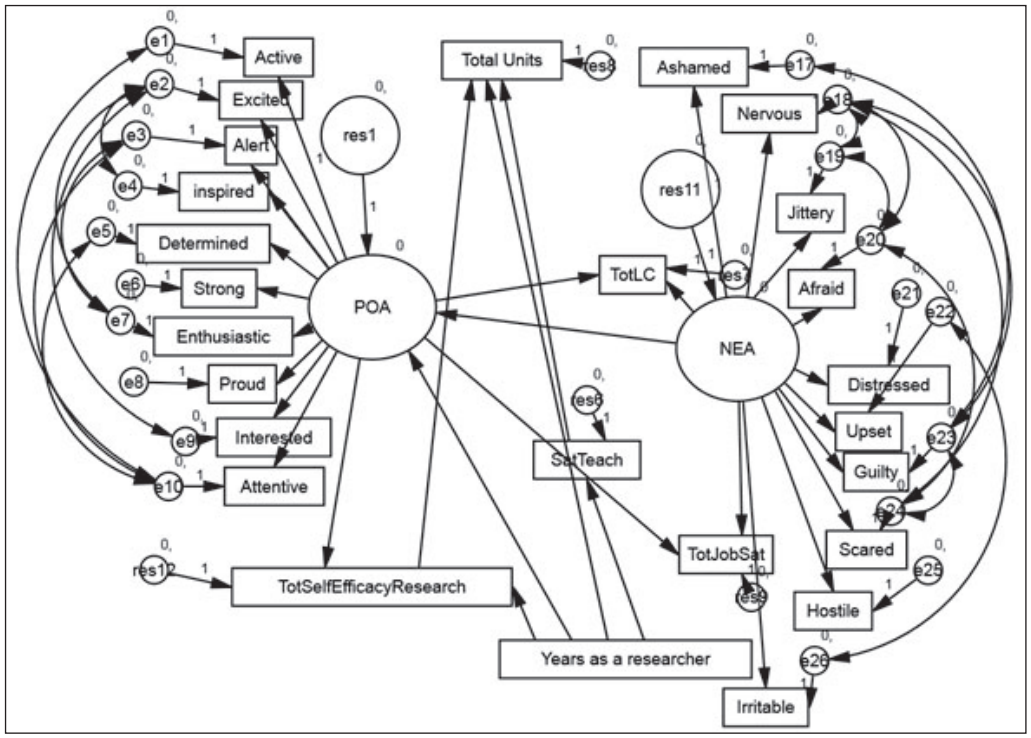
SPSS 21 and its AMOS structural equation modelling software was used to analyse the data. The use of scales was based on precedent in the literature. Where possible, scales were required to have already been tested for validity and reliability in other contexts. They were then tested again, during piloting, prior to their use in the questionnaire. Factor analysis tests were also run to ensure that the constructs met the prescriptions of convergent and discriminant validity (Campbell & Fiske 1959).

Certain limitations, however, are acknowledged. The cross-sectional nature of the study does not allow a perspective of trends in the tested relationships. It is recommended that further research replicate this study over time in order to ascertain trends in this context. Another limitation is the inability of statistical methods to ascribe causality; correlation cannot 'prove' causality. This study can therefore only offer a test of relationships that are grounded in theory; theory is tested. Nevertheless, it is left to further qualitative analysis to unearth the specific causal mechanisms that underlie the empirical findings of this study. Having considered certain limitations of the study, the specific measures used are now discussed:

- The dependent variable was measured as total units of output, which was an additive function of all Thomson Reuters Institute for Scientific Information (ISI), Proquest International Bibliography of the Social Sciences (IBSS) and South African Department of Higher Education (DHET) accredited journal article publications, conference proceedings publications, presented conference papers and published book chapters.
- Positive and negative affect were measured using Watson et al.'s (1988) twenty-item Positive and Negative Affect Schedule (PANAS).
- Locus of control was measured using Spector's (1988) sixteen item work locus of control scales (alpha=.738).
- Job satisfaction was measured using Likert-type items derived from the Minnesota Satisfaction Questionnaire scales (Arvey, Bouchard, Segal & Abraham 1989; Muchinsky 1983); three items were used (alpha=.859).
- The satisfaction with teaching item was phrased as follows: 'most of my satisfaction in my job comes from the teaching work I do'.
- Years as a researcher was sampled as the number of years an individual had worked as a researcher.
- The self-efficacy scale was derived from Bandura's (2006) scales, designed to sample self-efficacy related to an overall index of self-efficacy associated with research, comprised of measures of self-efficacy for ISI/IBSS accredited journal article publication, DHET journal article publication, conference proceedings publication and conference presentations.

The first model (shown in Figure 1) returned a chi-squared value of 917.028 ($p<.0001$) with 295 degrees of freedom (df), 377 distinct sample moments and 82 distinct parameters estimated. The comparative fit index (CFI) value indicated a poor fit with the data (.691), as did the root mean square error of approximation (RMSEA) value of .097. The expected cross-validation index (ECVI) value is 4.826. Post-hoc tests were then conducted to improve the fit of the model (Byrne 2010).

A review of the modification indices (MI) revealed sources of misfit within the model. The structural model was adjusted. Constraints to paths were removed, where indicated, as long as the process was guided by substantive or theoretical rationale (Byrne 2010). The fit-adjusted model (chi-squared=469.937; $p<.0001$; df=277; CFI=.905; RMSEA=.056; ECVI=2.991) is shown in Figure 2. Mardia's normalised estimate of multivariate kurtosis value for this model, however, was 170.656. Individual variable values were taken to exhibit skewness and kurtosis above the typical limits. Bootstrapping was therefore applied in order to have a measure of confidence in the results despite the underlying non-normality of the data. All the reported relationships for the fit-adjusted model were significant, according to the bootstrapped confidence intervals. The findings are now reported and discussed as follows (in each case the standardised values of effects are used for the purposes of discussion, unless otherwise indicated). Figure 2 shows the exploratory structural and measurement model that reflects the actual significant relationships found in the data (Byrne 2010).



Note: NEA: negative affect; POA: positive affect; LC: locus of control

Figure 2: Exploratory structural and measurement model that reflects the actual significant associations found in the data

Results and discussion

The descriptive statistics for the sample are shown in Table 1. The 'determined' variable had the highest mean, followed by 'interested' and 'attentive'. The variables with the lowest means were 'ashamed' and 'hostile'. Individuals were found to report higher levels of PA than NA. Table 2 reports the values of the bootstrapped standard regression weights. Bootstrapping was used because of the detected presence of non-normality in the data. Table 3 reports the standardised indirect, or mediated, effects between the tested variables. In the sections that follow, each tested hypothesis is used as a heading.

Table 1: Descriptive statistics

	Mean	Standard deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Standard error	Statistic	Standard error
Self-efficacy research	425.25	106.358	-.496	.162	.227	.323
Satisfaction with teaching	4.24	1.583	-.128	.162	-.561	.323
Locus of control	69.56	10.622	-.398	.162	.649	.323
Job satisfaction	15.07	4.025	-.836	.162	.854	.323
Years as a researcher	10.199	8.842	1.598	.162	2.789	.323
Units of research output	21.97	35.672	3.233	.162	11.949	.323
Interested	4.13	.766	-.705	.162	.673	.323
Distressed	2.26	1.089	.719	.162	-.135	.323
Excited	3.55	.986	-.440	.162	.003	.323
Upset	1.95	1.014	.953	.162	.160	.323
Strong	3.59	.893	-.416	.162	.097	.323
Guilty	1.53	.911	2.109	.162	4.358	.323
Scared	1.74	.984	1.415	.162	1.577	.323
Hostile	1.50	.824	1.985	.162	4.267	.323
Enthusiastic	3.95	.857	-.636	.162	.339	.323
Proud	3.48	.945	-.089	.162	-.491	.323
Irritable	2.21	1.144	.882	.162	.056	.323
Alert	3.70	.928	-.521	.162	-.088	.323
Ashamed	1.31	.762	3.675	.162	17.910	.323
inspired	3.64	.891	-.257	.162	-.111	.323
Nervous	2.04	1.054	1.052	.162	.617	.323
Determined	4.17	.801	-.894	.162	.866	.323
Attentive	4.00	.829	-.616	.162	.200	.323
Jittery	1.71	.964	1.331	.162	1.137	.323
Active	3.86	.951	-.662	.162	.016	.323
Afraid	1.65	.989	1.692	.162	2.432	.323

Table 2: Bootstrapped estimates of standardised regression weights

Parameter			Estimate	Lower	Upper	P
POA	<—-	NEA	-.432	-.547	-.302	.002
POA	<—-	Years as a researcher	-.197	-.309	-.102	.002
Satisfaction with teaching	<—-	Years as a researcher	-.168	-.278	-.071	.008
Self-efficacy research	<—-	Years as a researcher	.348	.260	.433	.003
Self-efficacy research	<—-	POA	.390	.274	.503	.002
Active	<—-	POA	.493	.351	.598	.003
Excited	<—-	POA	.527	.403	.626	.002
Alert	<—-	POA	.519	.393	.614	.003
Inspired	<—-	POA	.674	.589	.751	.001
Determined	<—-	POA	.644	.563	.725	.001
Strong	<—-	POA	.593	.488	.674	.004
Enthusiastic	<—-	POA	.719	.649	.792	.001
Proud	<—-	POA	.521	.421	.614	.001
Interested	<—-	POA	.616	.506	.693	.003
Ashamed	<—-	NEA	.444	.305	.567	.003
Nervous	<—-	NEA	.532	.383	.645	.004
Afraid	<—-	NEA	.582	.444	.680	.003
Distressed	<—-	NEA	.658	.547	.741	.003
Upset	<—-	NEA	.729	.635	.810	.002
Guilty	<—-	NEA	.496	.370	.605	.003
Scared	<—-	NEA	.578	.447	.672	.004
Hostile	<—-	NEA	.621	.506	.715	.003
Irritable	<—-	NEA	.717	.612	.795	.004
Units of research output	<—-	Satisfaction with teaching	-.121	-.203	-.032	.020
Units of research output	<—-	Self-efficacy research	.194	.099	.285	.002
Locus of control	<—-	NEA	-.250	-.401	-.079	.021
Units of research output	<—-	Years as a researcher	.560	.430	.665	.003
Job satisfaction	<—-	POA	.352	.228	.468	.003
Job satisfaction	<—-	NEA	-.325	-.459	-.195	.001
Locus of control	<—-	POA	.209	.061	.344	.017
Attentive	<—-	POA	.515	.397	.607	.003
Jittery	<—-	NEA	.659	.549	.749	.002

Note: P: probability value; NEA: negative affect; POA: positive affect

Table 3: Standardised indirect effects

	Years as a researcher	NEA	POA	Self-efficacy research	Satisfaction with teaching
POA	.000	.000	.000	.000	.000
Self-efficacy research	-.077	-.169	.000	.000	.000
Satisfaction with teaching	.000	.000	.000	.000	.000
Jittery	.000	.000	.000	.000	.000
Attentive	-.102	-.223	.000	.000	.000
Job satisfaction	-.069	-.152	.000	.000	.000
Locus of control	-.041	-.090	.000	.000	.000
Units of research output	.073	-.033	.076	.000	.000
Irritable	.000	.000	.000	.000	.000
Hostile	.000	.000	.000	.000	.000
Scared	.000	.000	.000	.000	.000
Guilty	.000	.000	.000	.000	.000
Upset	.000	.000	.000	.000	.000
Distressed	.000	.000	.000	.000	.000
Afraid	.000	.000	.000	.000	.000
Nervous	.000	.000	.000	.000	.000
Ashamed	.000	.000	.000	.000	.000
Interested	-.121	-.266	.000	.000	.000
Proud	-.103	-.225	.000	.000	.000
Enthusiastic	-.142	-.311	.000	.000	.000
Strong	-.117	-.256	.000	.000	.000
Determined	-.127	-.278	.000	.000	.000
Inspired	-.133	-.291	.000	.000	.000
Alert	-.102	-.224	.000	.000	.000
Excited	-.104	-.228	.000	.000	.000
Active	-.097	-.213	.000	.000	.000

Note: NEA: negative affect; POA: positive affect

Hypothesis a: Affectivity is significantly associated with research output

Years as a researcher are found to have a direct (.560) and an indirect (.073) effect on research output. However, they have no indirect relationship with research output through either PA or NA. This suggests that neither PA nor NA has an influence on research productivity over and above the influence of years of experience as a researcher (specific human capital) (Becker 1964). The largest standardised regression weights in the model is between research output and years as a researcher (β=.560), followed by research self-efficacy (β=.194) and then satisfaction with teaching (β=-.121). These three effects dominate the model.

The squared multiple correlation statistics indicate that .450, or almost half, of the variance in total units of research output is contributed by these three variables.

These results might reflect the dominance of tacit learning, or specific human capital in the form of experience as a researcher (Becker 1964), and of research self-efficacy (Bandura 1982; Bernadowski et al 2013; Briley 2012; Calik et al. 2012; Ghasemizad et al. 2013), as predictors of research productivity in this context; *theory that predicts a direct influence for affect as an antecedent of job performance in other work contexts is not supported in this one*.

However, as shown in Table 3, PA is found to have an indirect effect on research output (.076), through the path of research self-efficacy, and NA is found to have an indirect effect on research output (-.033), through the path of PA and research self-efficacy. The direction (positive or negative) of these indirect effects is, however, consistent with the predictions of potential relationships with performance in the affect literature (Bledow et al. 2013; Brief et al. 1988; Lowe & Reckers 2012; Parker et al. 2013; Spector et al. 2000; Storbeck 2013). It is possible that task-related similarities or person-related similarities (Ho 2012; Raskin 1965) between research work and other types of work might exist, at least to the extent that the relationships between affect and performance predicted by the literature are found to be present in this cohort. The predicted contribution of PA to performance through job satisfaction (Watson et al. 1988) was, however, not found to be supported by these findings. Affect is also not found to potentially mediate or moderate the influence of any of the other tested variables on research productivity in the model. Figure 2 shows the final model, which consists of only significant paths.

In order to gain a holistic understanding of the tested relationships, the indirect associations of NA and PA that are not associated with research productivity are now also discussed. NA has an indirect effect on research self-efficacy (-.169), through the path of PA. The standardised regression weight of the influence of NA on PA is -.432 ($p<.002$). It is possible that PA might mediate the relationship between NA and self-efficacy. NA is a negative and significant predictor of PA (-.432; $p<.002$).

NA also has an indirect effect on job satisfaction (-.152), through PA. The total effect of NA on job satisfaction is -.477. The direct effect of NA on job satisfaction is -.325 ($p<.001$). The squared multiple correlation of job satisfaction is .328, which suggests that just under a third of the variance in job satisfaction is explained by positive and negative affect. The only direct predictors of job satisfaction are PA and NA. PA is a direct predictor of locus of control (.209), job satisfaction (.352) and research self-efficacy (.390).

Due to the direct effects found here, it is argued that these results support the arguments of Spector et al. (2000) that affectivity has a substantive influence in this context and cannot simply be viewed as a 'nuisance' variable, as suggested by Podsakoff et al. (2003). Further research is suggested in order to be able to 'surface'

the causal mechanisms that underpin the indirect influence of affectivity on research productivity in this context.

Hypothesis b: Self-efficacy is significantly associated with research output

Research self-efficacy has a total effect size of .194 on research output, comprised only of a direct effect. Self-efficacy does not seem to be associated with any other mechanism related to any of the other intrinsic variables in this context. This result is consistent with predictions of a positive association between self-efficacy and performance (Bandura 1982; Bernadowski et al. 2013; Briley 2012; Calik et al. 2012; Ghasemizad et al. 2013). This significant relationship is typical of other work contexts, although it is acknowledged that it is not possible to ascribe this to either task-related or person-related similarities (Ho 2012; Raskin 1965).

Although self-efficacy has been found to have a weaker association with dimensions of performance that comprise tasks higher in complexity (Stajkovic & Luthans 1998), in this context this association is nonetheless significant. Unlike the effects of affect and locus of control, the potential influence of self-efficacy in this context might be similar to what is expected in other work contexts.

This context seems to reflect the dominance of specific human capital (Becker 1964), or the need for individuals to be able to convert experience into research output, and higher levels of self-efficacy might help individuals to do this. It is possible that these effects are so strong as to dominate, or 'crowd out' the influence of other psychographic variables that may have a stronger influence in other work contexts.

On the basis of these results, it is argued that academic research productivity may be atypical of other forms of job performance, as reflected in the literature. Drawing from the explanations offered by human capital theory (Becker 1964), it is concluded that research productivity might fundamentally represent a form of specific human capital, whereby even intrinsic relationships around research production may be specific to this type of job performance. This might be due to differences between research productivity in terms of its unique tasks that are different from the tasks associated with other types of work, or due to homogeneity in the type of individual that is ultimately over time 'selected into' becoming a researcher (Ho 2012; Raskin 1965). It is also possible that these effects reinforce each other, as they both predict differences between relationships predicted by theory derived in other contexts and tested relationships found in this context.

Hypothesis c: Locus of control is significantly associated with research output

The path from years as a researcher to research output through locus of control is not found to be significant. Furthermore, the direct path from locus of control to research productivity is also not found to be significant.

In terms of other relationships within the model, locus of control is potentially influenced by both positive and negative affect. However, neither affect nor locus of control is found to be associated with research output. According to the squared multiple correlations, 15.2% of the variance in locus of control is explained by the contribution of PA and NA. Locus of control is found to have no other significant associations in the model.

The lack of a significant association between an internal locus of control and research output does contest the predictions of the literature (Cheng et al. 2013; Khan et al. 2012; Rotter 1966; Spector & O'Connell 1994). As in the case of affect, the influence of locus of control in this context might suggest that research productivity, as a form of job performance, might be atypical of job performance in other work contexts. Given that this research tests only associations, and is not 'causal' in its methods, it is not possible to test whether the lack of associations for locus of control are due to differences in the unique nature of research productivity as a task, or due to the relatively unique nature of the researcher cohort, into which staff have been selected on the basis of various criteria (Ho 2012; Raskin 1965). It is also possible that these effects reinforce each other with regard to the locus of control results, as they both predict differences between relationships predicted by theory derived in other contexts and tested relationships found in this context.

Hypothesis d: Job satisfaction is significantly associated with research output.

The path from years as a researcher through job satisfaction to research output is not found to be significant. Job satisfaction is also not found to be directly associated with research productivity. The standardised indirect effect of years as a researcher on job satisfaction is -.069 (through PA). It is possible that PA may mediate the effect of years as a researcher on job satisfaction. The absence of a significant association between generalised job satisfaction and research output suggests that the various causal mechanisms that underlie this potential association, as predicted by the literature, might not present strongly in this context.

For example, the influence of organisational citizenship behaviour (Organ 1988 1997) is typically expected to be sensitive to dissatisfaction, which can disintermediate

its influence on performance. The absence of this significant association is also not consistent with historical meta-analysis findings (Judge et al. 2001), and other literature that has found generalised job satisfaction to be significantly associated with other forms of performance, such as firm value (Edmans 2012) and employee satisfaction measured as turnover (Liu et al. 2012).

Nonetheless, it is possible that many dimensions of satisfaction converge to make up generalised job satisfaction. In other words, there might be many different dimensions of job satisfaction that may 'cancel each other out'. Tests of specific dimensions of job satisfaction might be more appropriate, particularly those that are specifically expected to be more closely related to the primary tasks of a job in this context, such as satisfaction with teaching.

Hypothesis e: Satisfaction with teaching is significantly associated with research output

Satisfaction with teaching has a direct negative effect on research output. Years as a researcher also have an indirect effect on research productivity through satisfaction with teaching. Satisfaction with teaching is not found to have any other significant path, either directly or indirectly, with other variables in the model.

Job satisfaction also seems to be orthogonal to satisfaction with teaching in this context. This might suggest that although satisfaction with teaching is negatively associated with research output, its net influence on generalised job satisfaction might not be sufficient to sway the association between generalised job satisfaction and research output towards significance.

Years as a researcher predict research output with an indirect effect parameter value of .073. There are two paths through which the potential influence of years as a researcher passes on to research outputs: through self-efficacy and through satisfaction with teaching. The indirect effect from years as a researcher to research output that runs through self-efficacy with research has a value of .348 x .194 = .0675. This value suggests that self-efficacy might negatively moderate the influence of years as a researcher on research outputs. The indirect effect value from years as a researcher to research outputs (through satisfaction with teaching) is -.03 x -2.712 = .08. This value is less than the direct effect value of .560, which indicates that satisfaction with teaching may also negatively moderate the potential influence of years as a researcher on research output.

Dissatisfaction with teaching is therefore significantly associated with higher levels of research output. This might suggest some kind of intrinsically negative person-job (Erdogan & Bauer 2005), or person-task, fit between persons with higher

levels of satisfaction with teaching and research output. This result might reflect the predictions of activation theory, which suggest a potential misfit between the individual and the stimulus provided by certain tasks (Scott 1966).

Dissatisfaction can also stem from the nature of work tasks themselves (Hackman & Oldham 1976), which can result in lower performance. Individuals can also underperform in tasks that do not connect with an individual's intrinsic motivation (Herzberg 1968).

These findings reflect a long-standing specific tension associated with academic contexts: the tension between teaching and research, as work roles (Hattie & Marsh 1996). On the basis of these results, it is argued that satisfaction with teaching might conflict with research productivity in this context. Further research is recommended in order to more specifically investigate the causal mechanisms that may underlie this potential role conflict.

The negative association between satisfaction with teaching and research productivity seems to suggest the presence of a context-specific influence. It is possible that high teaching and high supervision loads might also impact directly and negatively on a researcher's research productivity, notwithstanding the fact that some produce outputs with students based on student work. These influences are acknowledged, even if the focus on this research was on intrinsic factors potentially related to research productivity.

The absence of certain associations predicted by the model suggests one of two primary conclusions. Either (i) characteristics of the tasks associated with research output as a form of job performance differ from other forms of job performance, or (ii) the field of academia differs from professional fields.

The negative association between satisfaction with teaching and research output falls into the category of explanations associated with (i). However, it is also possible that over time, on the basis of job-person fit (Erdogan & Bauer 2005), a professional field might select individuals into it with similar characteristics that result in a decrease in variance associated with different intrinsic measures. This might have resulted in range restriction (Sackett & Yang 2000), which would support the alternative category of explanations associated with (ii).

Given these results, however, it is acknowledged that both categories of explanation might be supported by these findings.

Conclusions

Theory and previous empirical findings from the job performance literature supported the predictions of the model tested in this context. However, in contrast

to the predictions of this model, NA, PA, generalised job satisfaction and locus of control were not found to be significantly and directly associated with research productivity. It is not clear, however, whether these differences from the predictions of the literature are due to the relatively unique nature of the tasks involved in research work, which may differ from many of the different types of work from which the predictions of the literature were derived. It is also not clear whether these differences are due to the relatively homogeneous nature of the cohort of professional academics who are researchers, which differs from other cohorts.

Three effects, however, were found to dominate as antecedents of research output: two positively and one negatively. Years as a researcher and research self-efficacy were found to positively predict the research outputs of academics in this context. It was argued *that research output is primarily a function of specific human capital* in this context, as predicted by human capital theory, where theory from other contexts does not necessarily generalise into this context due to the context-specific or tacit nature of research productivity. It is also concluded that self-efficacy might have a unique role to play in this context, where tacit learning is required to transmit years of experience as a researcher into research outputs.

Satisfaction with teaching was found to be a negative predictor of research output. It was concluded that there exists in this context *a dominant performance-related intrinsic differentiation of individuals by their satisfaction with teaching versus their satisfaction with research*.

On the basis of these results, it is argued that (i) research productivity may not be a typical form of job performance; it may requiring tacit learning, a form specific human capital that might be enabled by self-efficacy, and, or, that (ii) the professional academic cohort might not be typical of other work contexts in terms of its intrinsic relationships around research productivity as a form of job performance; homogeneity might exist that is reflected in range-restriction.

Researchers might be able to improve their research productivity through practice as a process of learning by doing, which may improve confidence and self-efficacy along the way, enabling a 'virtuous circle'. These findings suggest that other intrinsic differences between individuals might not be as important as the time invested in developing the fundamentally tacit skills associated with research. This mechanism, however, might require intrinsic alignment and a preference for research over teaching. These findings suggest that teaching satisfaction might be incommensurate with research performance, reflecting a possible intrinsic heterogeneity of academics in this context.

Any assumptions of intrinsic homogeneity that might be reflected in workload models, and in performance management practices, may need to be revisited in this

context. Further research might offer more insights into the research productivity-related costs presently associated with management systems that do not take the intrinsic satisfaction structure of academics into account in this context.

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