Re-evaluating doctoral researchers' well-being: what has changed in five years?

Hargreaves, C.E.[a*], De Wilde, J.P[a]., Juniper, B[b]. and Walsh, E[ai].

[a]*Graduate School, Imperial College London, 327 Sherfield Building, South Kensington Campus, London SW7 2AZ, UK.* [b]*Work and Well-being Ltd. 17 Osprey Quay, Emsworth, Hants PO10 8BZUK*

[i]Ms Elaine Walsh, Independent Educational Consultant from October 2014

[*]Corresponding author. Email: caroline.hargreaves@imperial.ac.uk

Re-evaluating doctoral researchers' well-being: what has changed in five years?

Well-being is a key indicator of social progress and is used internationally for policy formation and economic development. Doctoral researchers are strategic contributors to the knowledge and innovation led economy and their well-being throughout the doctorate therefore warrants attention. This research intensive university carried out the first well-being study of doctoral researchers using a clinically approved methodology (Impact Analysis) in 2009. Five years later the exercise was repeated to identify any changes.

With 1248 respondents to the 2014 survey (~40% response rate), overall well-being scores remained satisfactory, yet levels of stress and frustration related to research, as well as career uncertainty, had increased compared to the earlier study. Well-being was also lower for women and for later stage doctoral researchers. Recommendations emerged to enhance doctoral well-being and contribute to both the research experience and institutional development.

Keywords: well-being, PhD, impact, research-communities

Introduction

Well-being is a key indicator of social progress and is now used to inform development of services by the public sector, industry and governments (ONS, 2015; OECD 2016). Socio economic changes since 2008 have had negative effects on life satisfaction, stress, and anxiety and the OECD considers measuring well-being and progress a key priority (OECD, 2016). Interest in employee well-being is rising (CIPD, 2016), in line with growing awareness that work can impact negatively on employees and that there are increasing costs to state and employers associated with impaired physical and mental health in the working population (DWP 2016).

In higher education (HE) institutions, functional outcomes are traditionally used as indicators of progress. HEFCE (2016, p27) analysis of impact case studies confirms that UK higher education research has 'benefits to the economy, society, culture, public policy and services, health, the environment and quality of life, in the UK and overseas'. Total knowledge exchange income into HE in England in 2013-14 has increased 62 per cent in 10 years. Full-time postgraduate research entrants are estimated to have increased by almost 50 per cent in 10 years HEFCE (2016, p28). National Completion rates within 7 years are improving, and were predicted by HEFCE (2013) to be 72.9% of the 11545 doctoral starters in 2010/11. However, these positive functional indicators do not tell the whole story. For example, in the UK there have been serious incidents, including suicides, hitting the headlines, and universities nationally are increasing support systems for well-being (UUK 2015) and holding events to promote well-being (e.g. UKCGE, 2015). Despite this research intensive university (RIU) achieving good functional indicators, anecdote and experience of working with researchers indicate that some needs are not being met. As key players in the knowledge

and innovation led economy (Etzkowitz, 2008; Walsh *et al*., 2015) the well-being of doctoral researchers is worthy of study for the new insights it might offer.

Relevant factors in the HE research environment

Previous studies have shown that the research world is afflicted by potential threats to well-being of developmental and career uncertainty and changing contexts and communities in Higher Education (HE). Both factors are explored in the following sections.

Developmental and Career Uncertainty

Doctoral researchers generally begin their doctorates with little experience of the research world or its inherent uncertainties. Baxter Magolda (1999, 53) found that understanding identity and recognising uncertainty are only developed in the final stage of the development of learning, a stage not usually reached at undergraduate level. This suggests that doctoral researchers encounter new levels of uncertainty just as they begin their research careers. In a changing HE environment, doctoral students are uncertain about their futures, facing likely 'multiple careers' (Pritchard, MacKenzie and Cusack 2009, 29) and noting changes to academic career opportunities (The Royal Society, 2010 and 2014: McAlpine, 2014 and McAlpine *et al*., 2015). A study by El-Ghoroury *et al* (2012) showed that over 70% of graduate student participants reported at least one stressor that interfered with their functioning including uncertainty, and added to this, researchers are trained to be critical and so tend to underestimate their own abilities (Kearns *et al*., 2008).

Very low percentages of doctoral researchers become permanent research staff or reach professorial status (The Royal Society, 2010). Doctoral students often change their minds about future careers, believing that academic careers would not support a work life balance and note a lack of academic posts (Hakala, 2009; Mason, Goulden and Frasch, 2009). Women also leave science and engineering disciplines more than men at transitions from undergraduate study through postgraduate research (Gibbs, *et al*., 2014; Hancock, 2015).

Changing Contexts and Communities in HE

The pace of change in the HE environment, and policy change in particular, is described as 'relentless' by the Chair of the UKCGE (Deem, 2016) and has been increasingly discussed (Barnett, 2000; Metcalfe, 2006; Rowland, 2006; Leisyte and Dee, 2012 and Walsh *et al*., 2015). The role of the supervisor continues to be significant to researcher experience (Lee, 2008; Mainard *et al*., 2009). However, researchers often do not report Supervision as a cause for concern; for example in PRES nationally researchers were satisfied with Supervision, whilst the Research Culture domain scored lowest both in 2008 and 2015 (HEA, 2008 and Turner, 2015). HE Sector organisations have long been recommending improvements to the research community to improve researcher experience (UUK, 2009; QAA, 2013a and b). This is highlighted in much previous research (Juniper *et al*., 2012; Walsh, *et al*., 2013; Hargreaves, 2014). A study by Pyhältö, Stubb and Lonka (2009, 228) found that discontent with the learning environment correlated with 'stress, exhaustion and anxiety' in doctoral researchers. Gardner (2009) found that doctoral researchers tended to blame Faculty and departmental and institutional culture for leaving their programmes, while academics tended to place responsibility on the researchers. To reduce stress and isolation, academic, peer and family support and good rapport with doctoral advisors was

recommended for doctoral degree completion (Jairam and Kahl, 2012). Jawitz (2015) suggested initiatives for development activities for researchers entering academic careers which create opportunities for individuals to learn from within communities of practice. Hancock and Walsh (2014) also highlighted the importance of assisting doctoral researchers to develop their professional identity in a flexible way in response to uncertainty and to changes in their environment which may otherwise lead to stress.

Evaluating Well-being

Given both the complexity of the threats discussed above and the importance of the study population, re-evaluation of the well-being of the doctoral researchers in this RIU was considered justified. Well-being is a multi-faceted and subjective construct (Juniper, 2010). Definitions of well-being vary concerning: quality of work life, psychological well-being, job satisfaction, engagement at work as well as stress, anxiety and depression (Juniper 2010). We defined well-being to be 'that part of a researcher's overall well-being that is primarily influenced by their PhD position and which can be influenced by university-based interventions' (Juniper *et al*, 2012, 565). As this study looks at the overall well-being of researchers it does not solely assess stress. Studies which focus on areas such as stress use different evaluation scales e.g. the Job Demands Resources Model (Schaufeli and Bakker, 2004) or Conservation of Resources Theory (Hobfoll, 1989).

The RIU in this study carried out the first well-being study of its kind in 2009 and repeated it after 5 years. The same clinically approved methodology, Impact Analysis (IA) (Juniper, Guyatt, and Jaeschke 1996; Juniper, et. al., 2012), was used on both occasions. The overall aim of IA is to uncover problematic areas and use this

knowledge to form recommendations of what can be changed at the institutional level. To this end, a bespoke well-being assessment instrument was developed and deployed to consider the core academic context, environment and elements of well-being related to being a doctoral researcher with domains and questions devised by and for the doctoral researchers at the RIU.

Objectives

The aims of the 2009 study were to assess whether the well-being assessment instrument we devised demonstrated good content validity and internal reliability and to assess whether it offered new insights into the experiences of early-career researchers and how better to support them. The challenges and the changing contexts of HE described above have made the study of well-being even more pertinent since 2009 and the authors decided to repeat the study 5 years later. The particular objectives in 2014 were to re-evaluate researcher well-being, identifying changes compared to 2009, and to consider these changes in the current HE context, thereby forming recommendations of how to contribute to the research student experience and enhance institutional development of support mechanisms. This paper offers insights from our understanding of the doctoral experience at this RIU which may be of value to those at other institutions engaged in supporting researchers.

Method

This study applies the methodological framework of IA (not a factor analysis), and is based on previous models of 'Quality of Life in General' (Felce and Perry, 1995),

'Health Related Quality of Life' (Schipper, Clinch and Olweny, 1996), and 'Employee Wellbeing' (Danna and Griffin, 1999). Impact Analysis considers the subjective interpretation of the event by the survey participants, which is most relevant for well-being, rather than the event itself. Drawing upon Interpretative Phenomenological Analysis (Smith *et al*., 1999), this approach sets out with no hypothesis and uses no existing scales. Instead it identifies from the study population what they find bothersome in order to formulate the questionnaire.

The operational statement of doctoral researcher well-being used here is adapted from clinical practice (Juniper, 2005, 194) to be 'that part of a researcher's overall well-being that is primarily influenced by their PhD position and which can be influenced by university-based interventions' (Juniper *et al,* 2012, 565). Consistent with the IA approach, this definition places researchers' subjective perceptions central to enquiry, and variables are those that an academic institution may modify.

For the first evaluation in 2009, ethical approval was gained and a list of relevant 'items' (factors affecting well-being) was developed via semi-structured interviews with students and focus groups. Piloting and direct feedback led to minor modifications. The resulting questionnaire based upon these items reflected only areas of well-being important to doctoral researchers. For each item in the questionnaire, respondents were asked to score how important it was to their overall-well-being on a five-point Likert scale (1 = 'not at all important and bothersome' to 5 = 'extremely important and bothersome'). Three overall experience questions were included at the end of the questionnaire (and used Likert scales 1 = 'strongly agree' to 5 = 'strongly disagree'). Supporting content validity, respondents were asked to contribute comments

on any additional well-being experience in free text options. Juniper *et al.* (2012) give full description of the design of the instrument. Seven domains (or sub-scales) and 58 items were devised, the scale was shown to be reliable and the questionnaire had construct validity as explained by Juniper *et al.* (2012). The instrument is directional, considering aspects of the PhD position that can impact well-being, rather than how the well-being of researchers can impact their research studies.

Having again gained ethical approval in 2014, the Graduate School and Graduate Students' Union were consulted on possible additional questions to reflect current interests, resulting in nine additional items (available on request). The previous 7 domains and 58 items were retained to allow a direct comparison, as were the three questions relating to overall experience (Figure 1). The study population consisted of doctoral researchers from a Science, Technology, Engineering and Mathematics (STEM), Medicine and Business research-intensive, UK university. Distribution of the questionnaire was via e-mail shots to doctoral researchers at the institution, followed by e-mail adverts from the Graduate School and the Graduate Students' Union, to reach all levels of researcher.

The 2009 data shown here in results is from study spreadsheets or is as reported in Juniper *et al*. (2012). Each domain was examined for internal reliability (Cronbach's alpha coefficient (α)) (Tables 1 and 2). Acceptable values for α are greater than 0.7 (Rick *et al.,* 2001). Non-parametric statistics (as detailed in results section) were used for analysis because the data was based on Likert scale responses and thus considered ordinal, in addition to violating normality assumptions.

IA uses mean values which show the *impact* as the product of *frequency* (number of people) and *importance* (Likert rating of item) (Juniper *et al.* 2012). The strength of this approach is that it selects items important to the majority of the study population and those that may be very important to a smaller proportion. In this paper, whilst the IA means remain central to the method, showing the most important domains and allowing comparison to the 2009 study, the authors also chose to drill down into the data concerning the most bothersome items and reveal percentages of researchers finding any item 'very' or 'extremely' 'important or bothersome' (Table 4). Apparently low mean values could lead to a lack of recognition of the need for change, whereas reporting relatively large percentages of respondents being very or extremely bothered by certain items may more effectively highlight where action is needed. Where percentages were used, to facilitate statistical analysis, Likert scales 2 and 3 ('a bit' and 'moderately important and bothersome') were merged into '2' and 4 and 5 ('very' and 'extremely important and bothersome') were merged into '3'.

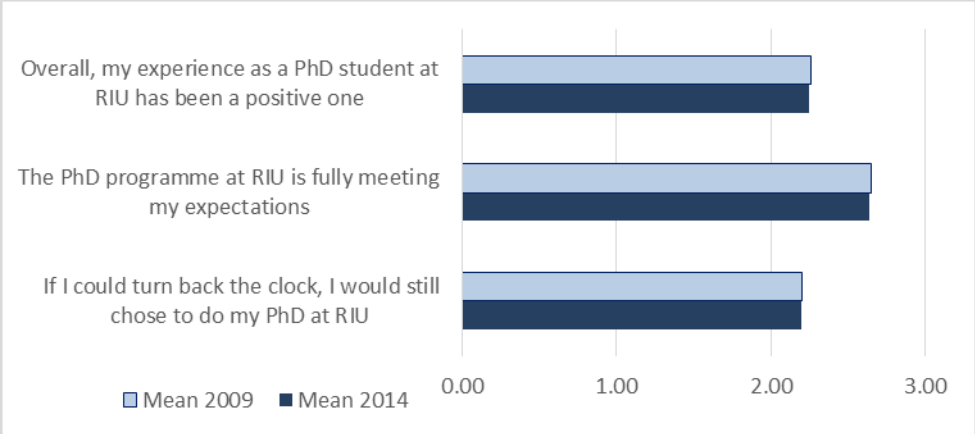
Results

Overall results

Of the 2014 doctoral population, 1248 complete assessments were returned, 40% (RIU Registry data). The proportion of respondents from different Faculties, Nationality Group, Stage and Campus reflected the population attending the institution well (data available on request). Women were slightly over represented in both studies compared to population at the RIU (Table 3).

Overall well-being levels were satisfactory (as 2 stands for ‘a bit’ and 3 ‘moderately’ ‘bothered and important’), with the highest domain mean impact score 2.42 (Table 1) and the highest item 2.84 (Table 4) and consistent with 2009. General experience of the institution is positive and most (71% of respondents; data not shown) were positive about their overall experience. Mann Whitney U-tests revealed no significant differences between the years on the three overall experience questions (all $p > .05$; Figure 1).

Figure 1. Doctoral researchers show satisfaction with their overall experience (1 = strongly agree, 5 = strongly disagree).



However three main points emerge: i) scores indicate a decline in well-being compared to 2009; ii) gender differences are found in all domains and iii) well-being scores decline with the stage of the doctorate.

Well-being 2009 compared to 2014

The domains are in the same order of importance, and the *Research* and *Health and Home* domain scores are statistically higher (worse) than the other domains as in the 2009 study. However, scores are higher than the 2009 study.

Table 1 Domain titles, description and impact scores 2014 and 2009.

Domains	**Description** How subjects perceive domain factors to impact overall well-being	**Mean well-being Score (SD)**		p value
		2009	**2014**	
Research	the experience of carrying out research	2.13 (.89)	2.42 (.81)	<0.001*
Health and Home	Issues to do with health and home life	2.07 (.86)	2.41 (1.00)	<0.001*
Development	opportunities for development	1.85 (.69)	2.14 (.81)	<0.001*
Social	relationships at university	1.85 (.82)	2.09 (.87)	<0.001*
University	wider issues of the University	1.82 (.75)	2.04 (.82)	<0.001*
Supervision	the supervisor	1.75 (.87)	1.97 (1.01)	<0.001*
Facilities	provision of university facilities	1.72 (.77)	1.95 (.87)	<0.001*
	Key: higher score signifies greater negative impact of factor, (1 = not important, 5 = extremely important) * Indicate significant differences after Bonferroni correction for multiple comparisons.			

Mann-Whitney U-Tests were conducted to investigate group differences for the 7 domains, using a Bonferroni-corrected alpha level ($\alpha = .007$). Scores were higher in 2014 compared to 2009 for all domains (all $p<.001$).

Within-groups analysis using Friedman's ANOVA revealed significant differences between domains for both the 2009 cohort ($\chi^2(7) = 656.90$, $p < .001$) and the 2014 cohort ($\chi^2(7) = 821.27$, $p < .001$). Wilcoxon's signed-rank tests were used to follow up the main effect. Pairwise comparisons were conducted between the top two domains (*Research* and *Health and Home*) and all other domains. In both cohorts, scores were similar in the *Research* and *Health and Home* domains, and both domain scores were significantly higher than all other domains (all $p < .001$).

Table 2 PhD Domains – Internal reliability and data distribution 2014 and 2009.

Domains	**Items per Domain 2009**	**Cronbach's alpha 2009**	**Items per Domain 2014**	**Cronbach's alpha 2014**
Research (RES)	7	.86	7	.88
Health and Home (HH)	11	.91	11	.93
Development (DVP)	9	.81	10	.84
Social (SOC)	11	.91	12	.92
University (UNI)	8	.79	13	.94
Supervision (SUP)	6	.91	8	.80
Facilities (FAC)	6	.78	6	.81

Table 3 Gender split in study populations and years of study

Gender	Study 2009	Actual 2009	Study 2014	Actual 2014
Male	52%	62%	57%	65%
Female	47%	38%	43%	35%

Compared to 2009, similar items are found to be in the top 10 as most important and bothersome (Table 4). Their impact has become greater and a higher percentage of researchers are reporting being very or extremely bothered. Almost all items registered as significantly more important in 2014 compared to 2009.

Table 4: Top 10 items 2009 and 2014, ranked according to 2014 impact scores.

Rank 2014	Well-being top 10 most important and bothersome items	**Means Impact Scores (SD)**		**p value**	**% very or extremely bothersome**		**p value** χ^2
		2009	**2014**		**2009**	**2014**	
1	Experiencing high levels of stress because of your research? HH	2.56 (1.32)	2.84 (1.35)	<.001 *	25.6%	32.7%	<.001*
2	Feeling frustrated/demotivated by your results and apparent lack of progress? RES	2.70 (1.30)	2.81 (1.34)	.043	30.6%	32.8%	0.2505
3	Being unclear about the next stage of your career after your PhD? DVP	2.37 (1.21)	2.73 (1.28	<.001 *	19.6%	26.5%	<.001*
4	Lacking confidence in your ability to conduct research to the necessary standard? RES	2.33 (1.21)	2.61 (1.24)	<.001 *	19.5%	25.4%	<.001*
5	Having a high workload that impacts on your private life? HH	2.27 (1.29)	2.59 (1.34)	<.001 *	20.7%	25.3%	0.007
6	Feeling disappointed in your own abilities as an academic researcher? RES	2.16 (1.23)	2.59 (1.34)	<.001*	17.1%	26.2%	<.001*
7	Experiencing a persistent low mood because of your research? HH	2.19 (1.23)	2.56 (1.37)	<.001*	17.0%	27.9%	<.001*
8	Making unreasonably high demands of yourself in the name of research? HH	2.24 (1.28)	2.55 (1.28)	<.001*	19.1%	24.3%	0.002*
9	Feeling constantly tired and run-down because of your workload? HH	2.17 (1.23)	2.55 (1.31)	<.001*	17.1%	25.2%	<.001*
10	Being unclear about the required standard of work for your thesis? DVP	2.16 (1.19)	2.55 (1.23)	<.001*	17.1%	24%	<.001*

Note: * Indicate significant differences after Bonferroni correction for multiple comparisons.

Item score differences between groups were assessed with Mann-Whitney U-tests, and the proportion of respondents rating the item as either very or extremely bothersome was compared using Chi-square tests.

Of the top ten items in Table 4, eight fall in the *Research* and *Health and Home* domains. The *Supervision* domain did not rank highly nor did *Supervision* items rank in the worst 10 items (Tables 1 and 4).

Well-being declines depending on gender and stage of the doctorate.

Well-being was significantly worse for women and those in the writing up stage of the doctorate. Comparisons are presented here for the top two domains top two domains for impact which were *Research* and *Health and Home* (Tables 5 and 6).

Table 5 *Research* and *Health and Home* domain impact scores of male and female respondents from 2009 and 2014.

Domain	**Mean (SD) domain scores 2009**			**Mean (SD) domain scores 2014**		
	Males (n=628)	**Female (n=574)**	**p value**	**Male (n=706)**	**Female (n=538)**	**p value**
Research	2.02 (.85)	2.24 (.91)	<.001*	2.31 (.96)	2.57 (.97)	<.001*
Health and Home	1.96 (.83)	2.19 (.92)	<.001*	2.27 (.97)	2.60 (1.01)	<.001*

Mann-Whitney U-tests showed significant differences between males and females for all domains, apart from *Social* and *University* for both years and for *Facilities* in 2014 (data available on request).

Table 6. Domain scores at early and late stages of the PhD programme in 2009 and 2014.

Domain	**Mean (SD) domain scores 2009**			**Mean (SD) domain scores 2014**		
	Early stage (n=513)	**Writing-up (n=142)**	**P value**	**Early stage (n=406)[1]**	**Writing-up (n=158)**	**P value**
Research	1.96 (.87)	2.23 (.91)	<.001*	2.20 (.92)	2.66 (1.05)	<.001*
Health and Home	1.87 (.84)	2.37 (.89)	<.001*	2.15 (.92)	2.78 (1.08)	<.001*

Note: * indicate significant differences after Bonferroni correction for multiple comparisons.

[1] Institutional reporting changes resulted in shorter early stage in 2014, leading to lower n value.

In 2014 there were significant differences between stages for all domains, barring *Social*; in 2009 there were significant differences between all domains, barring *University* (data available on request).

Discussion

Overall

Overall well-being levels were satisfactory. However, although 71% of respondents were positive about their overall experience, other changes gave cause for concern.

Both top two domain scores (*Research* and *Health and Home*) were higher (worse) than the other domains, and scores were significantly higher for all domains than in the 2009 study. The impact of each of the top 10 most important and bothersome items has become greater and a higher percentage of researchers are reporting being very or extremely bothered by them than in 2009. Viewed as a whole, these results indicate that well-being has declined since 2009.

When evaluating the importance of these changes, we need to consider the extent to which external factors may have contributed to them. Increased awareness, changes in HE and the economic environment may play roles in increased reporting of well-being issues.

Well-being, mental health and stress issues are now discussed more openly on national media and there is increased acknowledgement of their importance both nationally and internationally (UUK, 2015; UKCGE, 2015; OECD, 2016); raised awareness may have contributed to increased reporting in surveys. Findings may also be consistent with national and international well-being levels which have not yet recovered since the economic downturn (Beardsmore and Randal, 2015).

Even though this RIU achieves good employment rate statistics with graduates having a very good chance of finding a professional job within six months of leaving university (THE 2016), researchers may still have been affected by economic concerns and apprehensive about their prospects, reflected in the item *Uncertainty about Career*. Doctoral Researchers may be aware of departmental changes, including restructuring (Hakala, 2009; Mason, Goulden and Frasch, 2009 and McAlpine *et al*., 2015) which they may perceive lessen their opportunities for academic employment. Uncertainty arising from their stage of intellectual development (Baxter Magolda, 1999), a lack of clarity of career options (Pritchard, MacKenzie and Cusack, 2009) and as an inherent ingredient of research will ensure that doctoral research is challenging and a certain amount of frustration, stress and low mood may be inevitable.

The HE context and staff situation may also impact on researchers' well-being. Kinman and Wray's 2013 study reported worsened well-being in HE staff compared to 2008 in most of the 'Health and Safety Executive stressor categories'. Changes to national funding for HE can make staff within organisations more competitive with each other (Leisyte and Dee, 2012) and all levels of management, academic and support staff may perceive less secure futures. At the time of the 2014 study, the 'Research Excellence Framework' (REF, 2014) was being carried out; academic and support staff frequently bear significant workloads, particularly when undergoing Quality Assurance measures, and their stress is often transmitted to those around them. Increasing performativity (Deem, Hillyard and Reed, 2007), for example with the introduction of further indicators such as the 'Teaching Excellence Framework', may make increased stress likely.

Interestingly, and despite the addition in 2014 of items relating to supervision and current concerns, the *Supervision* domain did not rank highly nor did *Supervision* items rank in the worst 10 items. This is consistent with Juniper *et al* (2012) and the PRES report (Turner, 2015), where supervision is amongst the most satisfactory. Doctoral students may tend to be overly self-critical (Kearns *et al*., 2008) and their loyalty to their supervisor is high so they may blame themselves, not considering that their supervisor may be able to alleviate stress and frustration. The supervisor may not be aware of issues affecting researchers' well-being (Gardner, 2009), so despite being the first and most trusted point of call for the researcher (Hargreaves, 2014) they may not be aware that they may be able to give needed support or know how to do so. It is also possible that researchers may not voice concerns to avoid possible damage to their future academic or career prospects; Cotterall (2013) refers to a 'culture of silence' which prevents change.

Differences in gender and stage of the doctorate

The results showed that well-being is lower in women and later stage PhDs. Gender issues are well documented nationally and internationally, women report lower satisfaction and leave science and engineering disciplines (Gibbs *et al*., 2014; Hancock, 2015; Turner, 2015). Women doctoral students' issues are discussed further in the next two sections. Writing up students, will usually face increased time and/or financial pressures, as funding may cease or perhaps they are forced to take on employment. These pressures may become more pronounced as researchers' progress through their roles and in the HE environment. Kinman and Wray's study shows that 72.8% of those working in HE agree or strongly agree that their job is stressful with 39% experiencing unacceptable levels of stress always or often (2013). Hughes and Tight (2013) referred

to the doctorate as ‘multi-faceted and complex’. Researchers’ support systems will change as they progress, as people leave and join their research environment, and they may be working increasingly in isolation, all factors known to increase stress (Ülkü-Steiner, Kurtz-Costes and Kinlaw 2000; Jairam and Kahl, 2012; Jawitz 2015).

During their doctorates, researchers may also have noticed aspects of life in academia, including staff work-life balance, which do not fit with their initial interests in research careers (The Royal Society, 2010). Late stage researchers are often not clear of their professional identity, nor have they necessarily decided on or applied for their next role (Mason, Goulden and Frasch, 2009; Hancock and Walsh, 2014). All these factors above will contribute to the increase in *Career Uncertainty* in particular and lowering of well-being in general as the doctorate progresses (Tables 1, 4-6).

In spite of external factors and the inherently troubling aspects of doing research, we feel that the findings of worsening well-being warrant attention. Arguably these findings add depth of insight to recent RIU and national PRES results (Turner, 2015) which highlight the need to better develop research communities, and should not be ignored.

Future work and limitations

This study is based on a sample of STEM, Medicine and Business doctoral researchers from one RIU, and as such it is not necessarily generalisable to PhD researchers at other institutions in other disciplines. Less than 10% of PhD researchers at this RIU are part time, so differences between part time and full time status were not captured in the survey. Well-being has changed over time amongst researchers at the RIU, however, the study did not evaluate well-being in the same sample of doctoral researchers.

Typically women complete surveys more than men (Turner, 2015; Couper *et al*., 2007). Consistent with this, women were slightly over represented (as they were in 2009), at 43% in this study compared to 35% at the institution, a factor which affects results. Table 3 shows that there is a lower percentage of women completing the survey in 2014 than 2009, hence the decreased well-being in domains is not attributed to this. Taking into consideration different gender reporting tendencies, there is an important gender difference as well as increased reporting of worsened well-being in both genders since 2009 which warrants investigation. Further analysis using, for example, breakdown of gender, stage and department combined with qualitative research will help to clarify the issues.

Recommendations

The final objective of this study was to gain insight to allow well-founded recommendations to contribute to the well-being of doctoral researchers. Impact Analysis considering highest scores, show that the *Research* and *Health and Home* domains scored worse for well-being and therefore interventions that can impact the

domains and items with the highest scores are recommended.

Four main recommendations have emerged: enhance integrated support for doctoral students, in particular for female doctoral students; improve support for later stage doctoral researchers; further develop the training and understanding of well-being for all staff who engage with doctoral students; improve signposting of support to all (staff and students).

Enhance integrated support for doctoral students, in particular for female doctoral students

Support systems have grown in most institutions over the years, and there is much existing high quality support for staff and students. A more integrated and networked approach to support would facilitate awareness and use of the support systems (Juniper *et al*. 2012; Hargreaves, 2014; McCulloch and Loeser, 2016). The postgraduate research community and culture should be developed to support all stakeholders, e.g. support and academic staff, supervisors, post docs, as well as doctoral students. Researchers who feel part of a community will have greater awareness of expectations, opportunities and support structures (formal and informal). The support of an enhanced research community and culture would allow for flexible provision and assist underrepresented and female doctoral students, as well as those suffering lowered well-being to reach their goals.

Improve support for later stage doctoral researchers

Whilst specific late stage support is available at HE institutions, it may be an appropriate time to take stock. In light of the results of this study, late stage provision

should be enhanced and better integrated with other services. Effective dissemination of the evidence and outcomes of this research may help to counter a certain degree of complacency that may arise from the commonly held view that the middle of the doctorate is the most stressful stage.

Further develop the training and understanding of well-being for all staff who engage with doctoral students. In particular, note the feelings of frustration, low mood and having to deal with uncertainty.

Enhanced cross departmental and integrated training of all staff and supervisors who work with doctoral students in discussing expectations, the recognition of stress and awareness of university support provision and services would facilitate signposting and improve researchers' well-being (Gardener, 2009; Jawitz, 2015).

Courses on managing uncertainty, motivation, resilience and stress should be better integrated and cross referenced in development programmes for both researchers and staff. Incorporation of data from research would enhance relevance. Adequate support and training for all staff to assist in acknowledgement and management of often stressful workloads would facilitate more positive internal and external collaboration. Increased collaborative working, with all staff and alumni could create a supportive working climate and establish a less pressured culture for students to navigate the entire research experience (e.g. co-delivered workshops, cohort working, acknowledgement of stressors and discussion of support provision and reflective practice).

Improve signposting of support to all (staff and students)

Full use of targeted and mixed methods of advertising and sharing information

(including verbal and visual signposting online and at key events and activities) on training, communities, support systems and representation opportunities would help to signpost. Improved communities and training would raise awareness in staff and students via word of mouth. Clear and up-to-date contact information regarding well-being, stress and mental health support is crucial, as many are not aware at the necessary time of who to contact, whether within departments or university wide.

Finally, we recommend that future national studies, such as PRES, incorporate further relevant questions regarding well-being. Future analysis involving comparisons of gender and stage, including qualitative analysis, may provide further insights to specific groups of researchers.

Conclusion

This report considered a comparison of results with an earlier study using a new method to evaluate well-being in doctoral researchers. This evaluation tool allows institutions to identify areas that require development. The report noted particular aspects of research life which impact most negatively on the well-being of doctoral researchers and ended with recommendations to enhance their well-being.

Overall well-being scores were found to be satisfactory. However, levels of stress and frustration related to research, as well as career uncertainty, had all increased over the five years since the previous study. Of particular concern were the lower reported well-being levels of women and late stage researchers.

Doctoral researchers are strategic players in the knowledge and innovation led economy, therefore greater attention should be paid to low levels of well-being amongst them. Of course, some lowered well-being may be 'normal' for research, but that must not dampen or frustrate efforts to tackle it in new, integrated and creative ways. Researchers deserve better support throughout their doctorates and underrepresented groups may need more focused guidance. Enhanced research and HE communities would result in researchers who are more aware of the support available to them, access development opportunities more readily and are able in turn to contribute to sustaining the relevance of services they access. Evidence from this study assists this RIU in responding more successfully to the needs of its research communities, to benefit both researchers and the institution and can inform other institutions in the sector.

Notes on Contributors:

Dr Caroline Hargreaves: SFHEA, designs and develops educational provision for doctoral researchers and researches doctoral students' and alumni views of their research experience.

Dr Janet De Wilde: PFHEA and Head of Postgraduate Professional Development at Imperial College London. Her team deliver an exciting programme for 7000 postgraduates.

Dr Bridget Juniper: Founder and Director of Work and Well-Being Ltd, and a Chartered Occupational Psychologist. Researches and lectures at Cranfield University and Goldsmiths.

Ms Elaine Walsh: Independent soft skills development consultant. For more than ten years, Elaine led the team responsible for postgraduate professional development at Imperial.

Acknowledgements: We would like to thank the participants in this research, the Graduate School, Education office, and statistical advisors, without whose support the project would not have been possible. Working with doctoral students, we have an interest in the well-being of doctoral students and enhancement of provision.

References:

Barnett, R. (2000) Realising the University in an Age of Supercomplexity, Buckingham, SRHE/Open University Press

Baxter Magolda, M. B. (1999) Creating Contexts for Learning and Self Authorship, Constructive-Developmental Pedagogy, Nashville, Vanderbilt University Press.

Beardsmore, R. and Randall, C. (2015) Measuring National Well-being: International Comparisons, 2015, Office for National Statistics http://www.ons.gov.uk/ons/dcp171766_406995.pdf accessed 02/2016

CIPD (2016) https://www.cipd.co.uk/knowledge/culture/well-being 11/2016

Couper, M. P., Kapteyn, A., Schonlau, M. and Winter, J. (2007). Non-coverage and nonresponse in an Internet survey. Social Science Research, 36:1, 131-148.

Cotterall, S. (2013) More than just a brain: emotions and the doctoral experience Higher Education Research & Development 32:2 p174-187.

Danna, K. and Griffin, R. W. (1999), Health and well-being in the workplace: A review and synthesis of the literature, Journal of Management, vol. 25, no. 3, pp. 357-384.

Deem, R. (2016) UKCGE Chair Quarterly Winter 2015-16, http://www.ukcge.ac.uk/article/chair-quarterly-winter-2015-16-282.aspx accessed 02/2016

Deem, R., Hillyard, S. and Reed, M. (2007) Knowledge, higher education and the new managerialism In the Changing Management of UK Universities Oxford University Press

DWP (Department for Work and Pensions) https://www.gov.uk/government/collections/health-work-and-wellbeing-evidence-and-research (accessed 10/2016)

El-Ghoroury, N.H., Galper, D.I., Sawaqdeh, A. and Bufka, L.F. (2012). Stress, coping, and barriers to wellness among psychology graduate students. Training and Education in Professional Psychology, 6:2, 122-134.

Etzkowitz, H. (2008) The Triple Helix: University-Industry-Government Innovation in Action. Routledge, New York and London pp176

Felce, D. and Perry, J. (1995), Quality of life: Its definition and measurement, Research in Developmental Disabilities, vol. 16, no. 1, pp. 51-74.

Gardner, S.K. (2009) Student and faculty attributions of attrition in high and low-completing doctoral programs in the United States. Higher Education 58:1, 97-112

Gibbs, K.D. Jr., McGready, J., Bennett, J.C. and Griffin, K. (2014) Biomedical Science Ph.D. Career Interest Patterns by Race/Ethnicity and Gender PLOS DOI: 10.1371/journal.pone.0114736 http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0114736 accessed 03/2016

Hakala, J. (2009) Socialization of junior researchers in new academic research environments: two case studies from Finland. Studies in Higher Education, 34:5, 501-516

Hancock, S. (2015) Access and Equality in Doctoral Education conference paper in UK Society for Research into Higher Education Annual Conference, Newport

Hancock, S. and Walsh, E. (2014) Beyond knowledge and skills: rethinking the development of professional identity during the STEM doctorate. Studies in Higher Education 41: 1, 37-50

Hargreaves, C.E. (2014) Doctoral alumni views in hindsight: learning through uncertainty, identifying opportunities 'if I could go back and do it now'. UK Society for Research into Higher Education Annual Conference, Newport

HEA (Higher Education Academy) (2008) Postgraduate research experience survey. https://www.heacademy.ac.uk/sites/default/files/pres2008.pdf accessed 02/2016

HEFCE (2013) Rates of qualification from postgraduate research degrees Projected study outcomes of full-time students starting postgraduate research degrees in 2010-11 http://www.hefce.ac.uk/pubs/year/2013/201317/ accessed 10/2016

HEFCE (2016) Higher education in England 2016 Key Facts September 2016/20 http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/2016/201620/HEFCE2016_20.pdf accessed 10/2016

Hobfoll, S. E. (1989) Conservation of resources: A new attempt at conceptualizing stress. American Psychologist, 44:3 513-524. http://dx.doi.org/10.1037/0003-066X.44.3.513

Hughes, C. and Tight, M. (2013) The metaphors we study by: the doctorate as a journey and/or as work. Higher Education Research & Development. 32:5 p765-775

Jairam, D. and Kahl, D.H. Jr. (2012) Navigating the doctoral experience: the role of social support in successful degree completion. International Journal of Doctoral

Studies. Vol 7 http://ijds.org/Volume7/IJDSv7p311-329Jairam0369.pdf accessed 03/2016

Jawitz, J. (2015) Learning in the academic workplace: the harmonization of the collective and the individual habitus, Studies in Higher Education 34: 6, 601-614

Juniper, B. (2010) Evaluation of a Novel Approach to Measuring Well-Being in the Workplace, PhD Thesis, Cranfield Health, Cranfield University.

Juniper, B. Walsh, E. Richardson, A. and Morley, B. (2012) A new approach to evaluating the well-being of PhD research students, Assessment & Evaluation in Higher Education, 37:5, 563-576

Juniper, E. F. 2005 Assessing asthma quality of life: its role in clinical practice. Breathe 1:3 193-204

Juniper, E. F., Guyatt, G. H. and Jaeschke, R. (1996), How to Develop and Validate a New Health-Related Quality of Life Instrument, in Spilker, B. (ed.) Quality of Life and Pharmacoeconomics in Clinical Trials, Second Ed, Lippincott-Raven Publishers, Philadelphia, US, pp. 49-56.

Kearns, H., Forbes, A., Gardiner, M. L. & Marshall, K. M. (2008) When a high distinction isn't good enough: a review of perfectionism and self-handicapping. Australian Educational Researcher., 35, 21-36.

Kinman, G. and Wray, S. (2013) Higher Stress. A survey of stress and well-being among staff in higher education https://www.ucu.org.uk/media/5911/Higher-stress-a-survey-of-stress-and-well-being-among-staff-in-higher-education-Jul-13/pdf/HE_stress_report_July_2013.pdf 04/2016

Lee, A. (2008) How are doctoral students supervised? Concepts of doctoral research supervision. Studies in Higher Education, 33, 267-281.

Leisyte, L. and Dee, J.R. (2012) Understanding Academic Work in a Changing Institutional Environment In Smart, J.C. and Paulsen, M.B. (Higher Education Theory and Research Volume 27 Springer New York pp567

Mainard, T.,R. Van der Rijst, J. Van Tartwijk, and Wubbels, T. (2009) A model for the supervisor-doctoral student relationship. Higher education 58: 3, 359-73.

Mason, M.A., Goulden, M. and Frasch, K. (2009) Why graduate students reject the fast track. Academe Online, 95:1, 11-17 http://search.proquest.com/openview/83dfe313d8961831fc9ef0cb11d1c43c/1?pq-origsite=gscholar&cbl=41824 accessed 03/2016

McAlpine, L. (2014) Post-PhD trajectories: desperately seeking careers? Higher Education Review SRHE 47:1, p4-35

McAlpine, L., Turner, G., Saunders, S. and Wilson, N. (2015). Becoming a PI: Agency, persistence, and some luck! paper SRHE paper in submission International Journal of Researcher Development https://www.srhe.ac.uk/conference2015/abstracts/0107.pdf accessed 03/2016

McCulloch, A. and Loeser, C. (2016). Does research degree supervisor training work? The impact of a professional development induction workshop on supervision practice. Higher Education Research & Development, DOI:10.1080/07294360.2016.1139547

Metcalfe, J. (2006) The changing nature of doctoral programmes. Cambridge, UK GRAD Programme, CRAC (Careers Research and Advisory Centre) Ltd http://www.portlandpress.com/pp/books/online/fyos/083/0079/0830079.pdf accessed 03/2016.

ONS (Office for National Statistics) (2015) Personal Well-being in the UK, 2014/15 http://www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/personal-well-being-in-the-uk--2014-15/stb-personal-well-being-in-the-uk--2014-15.html accessed 02/2016

OECD (2016) Measuring Well-being and Progress: Well-being Research http://www.oecd.org/statistics/measuring-well-being-and-progress.htm accessed 02/2016

Pritchard, J., MacKenzie, J. & Cusack, M. (2009) The response of Physical Science post-graduates to training courses and the connection to their PhD studies. International Journal for Researcher Development, 1, 29-44.

Pyhältö, K., Stubb, J. and Lonka, K. (2009) Developing scholarly communities as learning environments for doctoral students. International Journal of Educational Development 14: 221-32.

QAA (2013a) UK Quality Code for Higher Education http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Quality-Code-Chapter-B11.pdf accessed 04/2013.

QAA (2013b) UK Quality Code for Higher Education http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Quality-Code-Chapter-B4.pdf accessed 04/2013.

Rowland, S. (2006) The Enquiring University: Compliance and Contestation in Higher Education, London, Society for Research into Higher Education and Open University Press.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. Journal of Organizational Behavior, 25, 293–315.

Schipper, H., Clinch, J. J. and Olweny, C. L. M. (1996), Quality of Life Studies: Definitions and Conceptual Issues, in Spilker, B. (Ed.) Quality of Life and Pharmacoeconomics in Clinical Trials Second Ed, Lippincott-Raven Publishers, Philedelphia, US, pp. 11-21.

Smith, J. A., Jarman, M. and Osborn, M. (1999), Doing interpretative phenomenological analysis, in Murray, M. and Chamberlain, K. (Eds.) Qualitative health psychology: Theories and methods, Sage, London, pp. 218-241.

THE (2016) Times Higher Education https://www.timeshighereducation.com/carousels/global-employability-university-ranking-2015-results (02/2016)

The Royal Society (2010) The Scientific Century securing our future prosperity https://royalsociety.org/~/media/Royal_Society_Content/policy/publications/2010/4294970126.pdf (02/2016)

The Royal Society (2014) Doctoral Students Career Expectations https://royalsociety.org/~/media/policy/projects/doctoral-students/doctoral-students-career-expectations-principles-responsibilities.pdf accessed 03/2016

Turner, G. (2015) PRES 2015: the research student Journey HEA https://www.heacademy.ac.uk/resource/postgraduate-research-experience-survey-2015 accessed 02/2016

UKCGE (2015) UK Council for Graduate Education, Mental Health and Wellbeing workshop, http://www.ukcge.ac.uk/article/mental-health-and-wellbeing-workshop-places-limited-268.aspx accessed 02/2016

Ülkü-Steiner, B., Kurtz-Costes, B. and Kinlaw, C.R. (2000) Doctoral student experiences in Gender-Balanced and Male-dominated graduate programs, Journal of Educational Psychology 92: 2, 296-307

UUK (2009) Promoting the UK doctorate: opportunities and challenges Universities UK

http://www.universitiesuk.ac.uk/highereducation/Documents/2009/PromotingUKDoctorate.pdf accessed 03/2016

UUK (2015) Student mental wellbeing in higher education Good practice guide Universities UK February 2015 http://www.universitiesuk.ac.uk/highereducation/Documents/2015/StudentMentalWellbeingInHE.pdf accessed 02/2016

Walsh, E., Anders, K., Hancock, S and Elvidge, L. (2013). Reclaiming creativity in the era of impact: exploring ideas about creative research in science and engineering, Studies in Higher Education, 38: 9, 1259-1273

Walsh, E., Hargreaves, C., Hillemann-Delaney, U. and Li, J. (2015) Doctoral researchers' views on entrepreneurship: ranging from ‘a responsibility to improve the future’ to ‘a dirty word’ Studies in Higher Education, 40:5, 775-790