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Job demands-resources theory extended: stress, loneliness, and care responsibilities impacting UK doctoral students' and academics' mental health

Akiko Ueno [a], Chong Yu [b], Lucill Curtis [c] and Charles Dennis [d]

[a]International Business, Marketing and Strategy Department, School of Management, University of Bradford, Bradford, UK; [b]Department of Marketing, Branding and Tourism, Faculty of Business and Law, Middlesex University, London, UK; [c]Marketing Group, Norwich Business School University of East Anglia, Norwich, UK; [d]Department of Marketing, Branding and Tourism, Faculty of Business and Law, Middlesex University, London, UK

ABSTRACT

Given the increasing challenges in academia since the onset of the Covid-19 pandemic, it is crucial to understand how work demands, life demands, and job resources affect the mental health of academic researchers. In extending the job demands-resources theory, the present study investigates the relationships between job resources, research work demand, life demand (i.e. caring responsibility), stress, loneliness and mental health among doctoral students and academics. The results from a secondary dataset of 4,563 academic researchers (academics undertaking research and doctoral students) in the UK indicate that job resources are positively associated with mental health, while caring responsibility and loneliness negatively impact mental health. Stress is also found to partially mediate (explain) the relationships between job resources, research work demand, and mental health. Moreover, loneliness moderates the positive impact of job resources on mental health, particularly attenuating this relationship for academic researchers who experience higher levels of loneliness. Surprisingly, during Covid-19, the moderation effect of gender on the path from caring responsibility to stress is significantly stronger for males than for female colleagues. Feeling unprepared, male colleagues who were pressured to take on caring responsibilities experienced higher stress. We suggest strategic interventions to enhance job resources and support researchers who have caregiving responsibilities, while also alleviating stress and feelings of loneliness. Future research should engage alternative perspectives at both individual (e.g. age, familial wealth) and institutional (e.g. education system, discipline/field) levels.

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Mental health; job demands-resources theory; stress; loneliness; academic researchers; doctoral students

Introduction

The issue of mental health among academic researchers (academics undertaking research and doctoral students[1]), has garnered significant attention in recent years (Chen and Lucock 2022; Hammoudi Halat et al. 2023; Kendrick and Tay 2024). Academic researchers often face significant stress and mental

CONTACT Akiko Ueno a.ueno@bradford.ac.uk International Business, Marketing and Strategy, School of Management, University of Bradford, Bright Building, Richmond Road, Bradford, Bradford BD7 1DP, UK https://www.linkedin.com/in/akiko-ueno-4782714b/

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health challenges due to pressures such as precarious job security, lack of recognition and reward, change, role, job demands and the relentless pressure to produce research outputs (Kinman 2019; Kinman and Court 2010; Nicholls et al. 2022), which can negatively affect wellbeing, particularly of achievement-orientated academics (Flaxman et al. 2012). Specifically, recent research underscores the severity and variety of issues affecting mental health among doctoral students, including low mood, anxiety, suicidal thoughts (Satinsky et al. 2021), feelings of isolation, loneliness, poor work–life balance, and concerns about funding and employment continuation (Dutta, Roy, and Ghosh 2022). Consequently, growing emphasis is being placed on preventive measures and interventions such as enhanced supervisor/peer support systems to improve the doctoral experience (Watson and Turnpenny 2022; Wollast et al. 2023). Likewise, the literature on academic staff mental health highlights the prevalence of various issues such as lack of job security, support groups, promotion opportunities, and resource access (Åkerlind 2008; Fetherston et al. 2021). These problems are compounded by high expectations for globally recognized research and excessive workload (Nicholls et al. 2022). Furthermore, the Covid-19 pandemic has exacerbated mental health conditions, with ramifications for academic researchers (Jackman et al. 2022; Rodrigues, Silva, and Franco 2021). Issues such as lack of digital skills, training, and socialization, online fatigue, and work-family conflicts have particularly strained academics during the pandemic (Bonanomi et al. 2021; Macciotta et al. 2022).

In light of this, research has begun to explore new ways of supporting academic researchers in a post-pandemic environment (Pyhältö, Tikkanen, and Anttila 2023; Webber et al. 2022). One prominent stream of literature, built upon job demands-resources (JD-R) theory, emphasises the importance of job demands and resources to academics' well-being (e.g. Lei et al. 2021). However, the relationships between institutional, social, and psychological or personal aspects of academic life have yet to be fully examined (McCarthy and Dragouni 2021), with a continued need to consider more specific demands and resources rather than broad categorizations (Naidoo-Chetty and du Plessis 2021b).

Accordingly, our study makes several unique contributions to this important field. To our knowledge, this is the only academic study that investigates mental health using a representative sample of 4,563 academic researchers from UK universities. The current study aims to extend the Job Demands-Resources theory by incorporating stress as a mediator and loneliness as a moderator. In this context, loneliness is defined as a negative emotional state resulting from insufficient social resources (Burholt, Windle, and Morgan 2017). Accordingly, we demonstrate the significant roles of stress and loneliness in the relationships among job resources, research work demand, the life demand of caring responsibility and mental health. Our study provides empirical evidence for developing targeted interventions and support structures. These measures are designed to enhance job resources, reduce stress, address loneliness, and support individuals with caregiving responsibilities, fostering a more inclusive and supportive higher education environment.

Literature review and hypotheses development

A holistic perspective on mental health, as proposed by Veit and Ware (1983), incorporates both psychological distress and well-being. Since then, the overall mental health of the general population has been evaluated using psychological distress and well-being as key indicators (e.g. Bufquin et al. 2021). Psychological distress embodies negative mental health aspects such as anxiety, depression, and stress, while well-being encompasses positive elements like life satisfaction, happiness, and emotional stability. This definition acknowledges that mental health is not merely the absence of distress but also the presence of well-being. Consequently, in this paper, we refer to mental health as encompassing both psychological distress and well-being.

Job demands-resources (JD-R) theory

JD–R theory has been widely applied to study occupational concerns, including work demands, resources, and work-related outcomes (Hoppner, Mills, and Griffith 2021). Job demands include

work aspects requiring significant physical and psychological effort and skills (Nahrgang, Morgeson, and Hofmann 2011). Job resources encompass physical, psychological, social, and organizational job elements, that facilitate goal achievement, mitigate job demands and related costs, or promote personal growth and learning (Bakker and Demerouti 2017). JD-R theory suggests that job demands can lead to increased exhaustion and physical health issues, while also reducing work engagement and well-being (Li et al. 2023). Similarly, within the academic realm, research has shown that job demands can have a detrimental effect on the well-being and performance of academic researchers (e.g. Han et al. 2020). However, job resources mitigate these adverse effects by enhancing coping capabilities (Bakker and Demerouti 2017). Job resources, conversely, are associated with improved mental health as they can promote a positive state of work engagement (Bakker and Demerouti 2017), and growth (Demerouti et al. 2001). In the academic environment, this theory has informed research on various types of job demands and resources and their impacts on work engagement and job performance. Empirical studies have shown that while job demands (e.g. heavy workload) can lead to burnout or exhaustion (Kinman and Johnson 2019), job resources (e.g. support from colleagues, rewards) can reduce the negative state (Boyd et al. 2011; Xu 2017). Further research has demonstrated that job resources, such as professional support, can help offset the costs associated with managing job demands, thereby reducing their negative impact on burnout (Lei et al. 2021). Other studies have explored a wide range of job demands (e.g. quantitative, qualitative, and organizational demands) (Naidoo-Chetty and du Plessis 2021a) and job resources in relation to well-being (Kinman and Johnson 2019; Sabagh, Hall, and Saroyan 2018). This prior research highlights the need for more empirical evidence on these relationships. Indeed, as suggested by Bakker, Demerouti, and Sanz-Vergel (2023), future research should continue to expand the concept and scope of demands and resources beyond the established outcomes.

A review of JD-R literature on academic staff (see Table A in the supplementary material) reveals several limitations. First, there is an ongoing need for further research to explore additional aspects of life beyond job demands (Zábrodská et al. 2018). Second, fewer studies have confirmed the critical mediating role of perceived stress in the relationship between job demands/resources and well-being (Adil and Kamal 2020). Third, while job resources have been shown to mitigate the negative impact of job demands on well-being, it remains inconclusive how a lack of personal resources (e.g. loneliness) could affect one's motivational process in response to job demands or job resources. In serving our research purpose to extend the literature on academic researchers' mental health, JD–R theory provides an understanding of the work environment by categorizing job characteristics into demands and resources (Bakker and Demerouti 2017; Schaufeli 2017). This theory is a useful lens for the purpose of the current study, because, among other advantages, it posits the differential effects of job demands and job resources on work engagement or burnout, which is an important perspective related to the perception of work stress and well-being (Schaufeli 2017).

In this study, we draw upon JD-R theory and expand the concepts of demands and resources to explore their influence on the mental health of academic researchers. Specifically, we examine the effects of research work demands, life demands related to caring responsibilities, and job resources, while considering conditional factors such as job category and loneliness. A summary of the most relevant JD-R literature, indicating the research gap that is bridged by the present study, is presented in the supplementary material Table A.

Job resources and mental health

Past research has demonstrated that organizational support tends to maintain employee positive mental health (Han et al. 2020). Similarly, support from the university can be crucial to academic researchers' well-being (Hutchings 2017). When academic researchers have access to university support, they are less likely to experience negative outcomes, such as burnout and fatigue. A lack of support, conversely, causes high stress (Björklund, Vaez, and Jensen 2021), psychological distress, and lower well-being (Dugas et al. 2020). Drawing support from Tytherleigh et al. (2005), we argue

that support from the university can aid researchers in coping with psychological distress. Consequently, job resources can help academic researchers to alleviate the psychological strain associated with challenging and demanding conditions. Thus, we expect that perceived job resources (e.g. support from university, supervisors and managers, and access to tools) have a positive effect on academic researchers' mental health. As this aspect has received much prior research, we do not seek to test the relationship in a formal hypothesis but nevertheless, for completeness, we include it in our conceptual model.

Research work demand and mental health

The COVID-19 pandemic has exerted a significant impact on the working lives of people across sectors (Sandoval-Reyes, Idrovo-Carlier, and Duque-Oliva 2021). Despite various challenges (e.g. isolation, limited resources), the pandemic also provided opportunities for remote work. This led to increased productivity, better work–life balance and improved well-being (Jackman et al. 2022). Interestingly, what used to be a job demand, i.e. (relatively fixed) working hours, has transformed into very flexible working hours, due to the pandemic, thereby positively affecting researchers' mental health. The reduction of commuting time and costs, the newfound flexibility in working hours, and increased autonomy over work schedules are among the benefits of working from home (Karatuna, Jönsson, and Muhonen 2022; Widar et al. 2022). These positive factors collectively contribute to a better work–life balance, leading to a reduction in work-related stress and an increase in well-being. On the other hand, some prior research has reported an opposite view. For example, other findings from Sweden suggest an association between remote working and stress (Heiden et al. 2021) and an older Irish study draws attention to increasing work-family conflict (Heijstra and Rafnsdottir 2010). Notwithstanding, the overall balance of recent research suggests an (albeit small) positive influence of flexible working on mental health (Hammoudi Halat et al. 2023; Shiri et al. 2022). Therefore, given these changing dynamics in job demands due to Covid-19, we hypothesize:

H1: Job demands due to Covid-19 have a positive effect on academic researchers' mental health.

Caring responsibility and mental health

A factor that may exacerbate stress and negatively affect mental health for many academic researchers is the additional pressure of unpaid care to family members (Henderson and Moreau 2020). Covid-19 lockdowns further intensified the impact of the life demand of caring responsibilities on the careers and studies of female academics (Yildirim and Eslen-Ziya 2021). In competitive academia, navigating conflicting identities of researcher and carer are burdened with additional pressures for carers as they try to reconcile increasing work demands with their caring responsibilities. Therefore, we hypothesize:

H2: Caring responsibilities have a negative effect on academic researchers' mental health.

Longer years of working and mental health

Doctoral students routinely report prolonged stress and mental health issues (Levecque et al. 2017). This is partly because of increasing pressures to finish their thesis and build a world-class research profile (Creaton and Handforth 2021). With longer service, doctoral graduates are more likely to gain permanent contracts which tends to enhance job satisfaction and well-being among doctoral graduates (Goldan, Jaksztat, and Gross 2023). With time, academic researchers (academics undertaking research and doctoral students) build networks and gain experience (George Mwangi et al. 2018), which can alleviate insecurity and anxiety (Ortlieb and Weiss 2018). Therefore, we hypothesize:

H3: Longer years of working have a positive effect on academic researchers' mental health.

Staff vs. doctoral student

Doctoral students often face depression and anxiety (Levecque et al. 2017) and suffer from the stressful and isolating nature of their work (Dhirasasna et al. 2021). Differences in the roles between doctoral students and staff may lead to differences in the mental health of doctoral students as compared to staff (Levecque et al. 2017). For example, doctoral students are likely to be earlier in their research journey and thus experience stress in adapting to their new roles as researchers (Cornwall et al. 2019). From this point on, and into their academic journey as staff (for those who do take that route), they become more independent, taking control of maintaining and enhancing their well-being (Schmidt and Hansson 2018). Academic staff, despite work-related stress, generally have more support (Dinu et al. 2021). While academic staff may also experience stress and psychological distress in their work, they may have more control over their workload and work–life balance and may also draw on support from the university (Dinu et al. 2021) and established support networks (George Mwangi et al. 2018). Therefore, we expect that:

H4: Staff report better mental health than doctoral students.

The mediating role of stress

The traditional origins of academic stress are described as both immersive and distanced (Ross, Scanes, and Locke 2023). Immersive stress arises from a competitive environment, with frequent rejection and criticism. Distant stressors stem from government decisions on funding and student fees, filtered down through hierarchical university executive teams (Ross, Scanes, and Locke 2023). Such stressors can cause mental health issues, e.g. anxiety or depression (Walker and Avant 2005). Covid-related work stress in particular increased psychological distress (Tindle, Hemi, and Moustafa 2022) and negatively affected well-being (Chen and Lucock 2022). In this context, stress is identified as a mediating variable that explains how external factors such as job resources, research/work demands during the pandemic, and the life demand of caring responsibilities exert their influence on the mental health of academic researchers. This mediating role of stress reflects its function as an intermediate construct that transmits the effects of these variables to the outcome of interest, which is mental health. In effect, lack of job resources, high research work demand, high life demand of caring responsibility, and shorter working years all negatively affect mental health, at least partially, through the mechanism of increasing stress. Hence, we expect that:

H5: Higher stress at least partially mediates the negative effects of (a) lack of job resources, (b) negative impact of research work demand and (c) caring responsibility on mental health.

The moderating role of loneliness

Prior research reports that academics and doctoral researchers suffer from loneliness (Ortega-Jiménez et al. 2021; Wildermuth, Dryburgh, and Woodward 2023). Loneliness, stemming from an inadequacy of social resources, operates as a detrimental moderator, exerting a negative influence on the interplay between job resources and the mental health of academic researchers (Jandrić 2022). Research based in the education sector (e.g. Arday and Jones 2022) has consistently verified the adverse impacts of loneliness on mental health. The dearth of social resources, as illustrated by the experience of loneliness, has the potential to increase anxiety, depression, and other negative moods; as observed in the work of Savolainen et al. (2021). Moreover, the experience of loneliness, such as feeling like an outsider within the academic community, can hinder the intention to seek and utilize job resources, especially, the support from peers or seniors (Deem and Brehony 2000). Conversely, in situations where academic researchers maintain a robust social network and experience reduced loneliness, they may find themselves better positioned to access job resources in a positive work state (Barkhuizen 2002). This, in turn, not only facilitates their exploration and

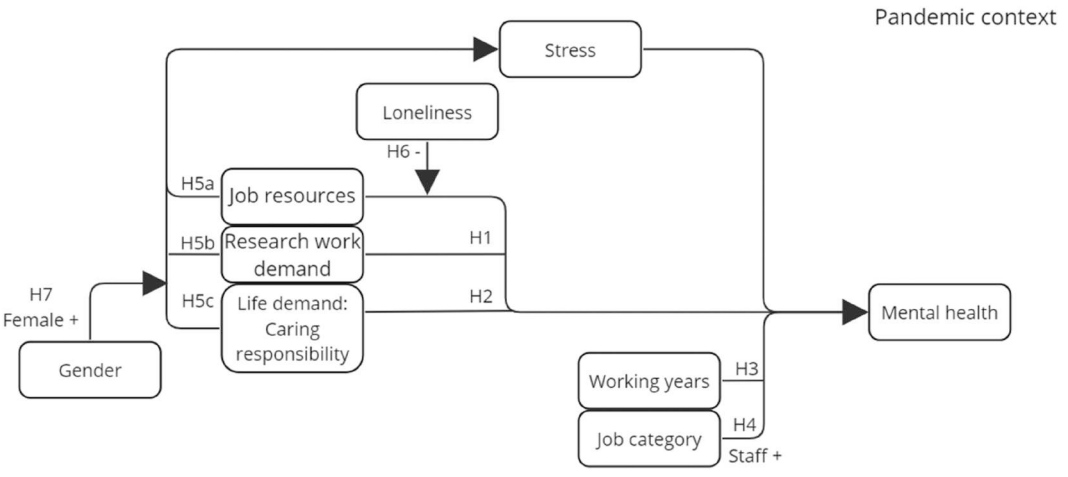

Figure 1. Conceptual model.

exploitation of job resources but also contributes positively to their mental health. Therefore, we hypothesize that:

> H6: Loneliness negatively moderates the effect of job resources on academic researchers' mental health: the positive effects of job resources on mental health are weaker for lonely academic researchers and stronger for non-lonely ones.

The moderating role of gender

Finally, we seek to explore the influence of gender on the relationship between caring responsibilities and stress. Combining academic work with family caring responsibilities like childcare and elder-care, elevates psychological distress in both men and women, adversely impacting mental health (Balloo, Pauli, and Worrell 2017; Hardy et al. 2018). Such demands lead to depression, anxiety, and poorer life quality (Hardy et al. 2018). In particular, the literature primarily emphasises the detrimental effects of caring responsibilities on established and early career female academics and doctoral students who face exacerbated psychological and career progression challenges due to caring responsibilities (Brown and Watson 2010; Spencer et al. 2021). The prevalence of women balancing traditional roles such as wife and mother with the responsibility of being the primary or dual income earners in their families has escalated due to recent global economic challenges and the cost-of-living crisis (Broadbent et al. 2023). This dual burden is particularly acute in academia, where workloads are relentless (Okeke-Uzodike and Gamede 2021), and affects female doctoral candidates balancing academic responsibilities and domestic duties (Brown and Watson 2010). The Covid-19 lockdowns further strained this balance, with increased childcare and homeschooling responsibilities falling predominantly on women, even when men were also at home (Akanji et al. 2023; Kasymova et al. 2021). Consequently, female academics experienced heightened stress, social isolation and lower well-being (Davis et al. 2022). Therefore, we hypothesize that:

> H7: Gender moderates the relationship between caring responsibility and stress such that the relationship is stronger for females.

The conceptual framework is illustrated in Figure 1.

Method

To test the hypotheses, we utilized a large dataset collected by Byrom and Metcalfe (2020) during the first UK lockdown, from 16 April to 14 May 2020. This dataset is unique, as it comprises nearly 6,000

responses (survey invitations were sent to 107 universities across the UK) from academic researchers (doctoral students and academic staff). Sample collection had a wide reach across all types of universities, with recruitment via email to all of the Vitae and SMaRteN (UK university researchers networks), supplemented by social media. Such a large sample size is difficult to achieve through primary data collection alone, making this dataset particularly valuable for our study. Although the data only includes UK-based participants, the UK's prominent role in the international knowledge economy and collaborative scientific research (Jackman et al. 2022) ensures the global relevance of our findings.

This study extends a three-page descriptive analysis by Byrom (2020) through conducting a more comprehensive analysis. We selected the following constructs from the data: for mental health, *well-being* from the SWEMWBS[2] (Ng Fat et al. 2017 originally developed by Tennant et al. 2007) and *psychological distress* from Kessler et al. (2010) (re-coding those scales from 1 – none of the time to 5 – all of the time); *support from the supervisory team/line manager* and *support from the university* (scaled from 1 – strongly disagree to 5 – strongly agree); *loneliness* (re-recoding the 3-point scale into a dichotomous variable of 1 – more lonely and 0 – no change or less lonely); *access to tools* and *stress* (summing the responses to the various items to form proxy continuous variables); *research work demand* (re-coding the scale from 1 – strongly negative to 5 – strongly positive, and summing the item responses into effectively a continuous variable), and *demographics*. We also tested for any effects of the following variables: age, ethnicity, disability and whether a Russell Group university. All those effects are non-significant and therefore play no further part in the analysis. After deleting missing responses, the number of respondents became 4,563. Table B in the supplemental material illustrates the respondent profile.

Hypotheses were tested in a structural equation model in SmartPLS 4, appropriate for the relatively complex model and non-normally distributed variables (Ringle, Wende, and Becker 2022). Job resources comprise *support from supervisory team/line manager, support from the universities* and *access to tools*. Mental health consists of *well-being* and *psychological distress*. Both convergent validity and reliability are satisfactory as all outer loadings and construct reliability (CR) were above 0.7 and all average variances extracted (AVEs) were above 0.5. All heterotrait-monotrait (HTMT) ratios of correlations are below 0.9 (except for the indicators of the second-order variables, which are expected to correlate), demonstrating discriminant validity. Similarly, all variance inflation factors (VIFs) are below 3.0, indicating no multicollinearity concerns. Table C in the supplemental material exhibits questionnaire items used for this study with outer loadings, AVE and CR. Table D in the supplemental material presents the HTMT ratios of correlations and the VIFs.

Results

Our model presents moderate predictive power, with R^2 of mental health .374. As expected, job resources positively impact mental health (standardized total effect (β) = .156, t = 7.04, p < .001, very small effect size Cohen's f^2 = .006). Perceived positive impact from research work demand leads to better mental health (β = .311, t = 21.51, p < .001, small effect size f^2 = .067) (H1 supported) although the average impact from research work demand is slightly negative (2.43). Caring responsibility as life demand negatively affects mental health (β = -.202, t = 13.796, p < .001, small effect size f^2 = .034) (H2 supported). Years of working in academia are positively associated with mental health (β = .035, t = 2.72, p < .01, very small effect size f^2 = .001) (H3 supported), indicating increased hardiness among established academics. Occupation category (academics undertaking research or doctoral student) influences mental health such that doctoral students report worse mental health than staff (β = .256, t = 8.80, p < .001, very small effect size f^2 = .017; $M_{students}$ = 3.04, M_{staff} = 3.26 on the 5-point scale, t = 9.50, p < .001) (H4 supported). Occupation category moderates the path from the impact of research work demand to stress such that the path is stronger for doctoral students, meaning that staff find research work demand less stressful than doctoral students (β = .092, t = 3.08, p = .001, very small effect size f^2 = .002). Similarly, the occupation category moderates the path from

the impact of research work demand to mental health such that the path is more strongly negative for doctoral students, meaning that doctoral students find research work demands have more negative effect on mental health than staff ($\beta = -.090$, $t = 3.44$, $p = <.001$, very small effect size $f^2 = .002$). Stress partially mediates the negative effects of (a) lack of job resources on mental health (job resources→stress $\beta = -.121$, $t = 8.37$, $p < .001$, very small effect size $f^2 = .016$; stress→mental health $\beta = -.352$, $t = 28.47$, $p < .001$, medium effect size $f^2 = .205$; job resources→mental health $\beta = -.114$, $t = 5.36$, $p < .001$, very small effect size $f^2 = .006$) (H5a partially supported); and (b) negative impact of research work demand (positive impact of research work demand→stress $\beta = -.242$, $t = 15.95$, $p < .001$, small effect size $f^2 = .061$; positive impact of research work demand→mental health $\beta = .226$, $t = 15.59$, $p < .001$, small effect size $f^2 = .067$) (H5b partially supported). Stress fully mediates the negative effects of caring responsibility mental health (caring responsibility→stress $\beta = -.574$, $t = 15.72$, $p < .001$, small effect size $f^2 = .050$, direct path caring responsibility→mental health non-significant) (H5c supported). Loneliness significantly moderates the relationship between job resources and mental health such that the path is stronger for academic researchers who feel lonely ($\beta = .045$, $t = 1.73$, $p < .05$, very small effect size $f^2 = .001$) (H6 supported), meaning that loneliness magnifies the negative effect of lack of resources on mental health. Loneliness also negatively impacts mental health directly ($\beta = .356$, $t = 14.01$, $p < .001$, medium effect size $f^2 = .036$). Doctoral students' worse mental health than staff is driven by these mechanisms and also from suffering greater loneliness ($M_{students} = 1.98$, $M_{staff} = 1.85$ on the 5-point scale, $t = 6.49$, $p < .001$). We also tested the moderation of gender on the path from caring responsibility to stress, finding that the path is significantly stronger for males ($\beta = .350$, $t = 4.97$, $p < .001$, medium effect size $f^2 = .006$) (H7 rejected reverse). Standardized path coefficients with effect sizes (Table E) and standardized total effects (Table F) are presented in the supplemental material.

Discussion

The findings of this study align with and extend the scope of JD-R theory through our adaptation, specifically by incorporating stress as a mediator and loneliness as a moderator in the relationship between job resources and mental health. This analysis provides a deeper understanding of the factors contributing to mental health in the academic work context. First, the results indicate a positive effect of job resources on mental health, consistent with previous research (Bakker and Demerouti 2017; Lesener, Gusy, and Wolter 2019). The role of stress as a mediator is particularly noteworthy, as it serves as a pathway and mechanism through which job resources impact mental health. The results indicate that a lack of job resources, the negative impact of research work demands, and caring responsibilities all tend to cause stress, which in turn leads to poor mental health. Another significant contribution is the finding of loneliness as a moderator in the relationship between job resources and mental health. Loneliness significantly moderates this relationship, making the connection stronger for those researchers who feel lonely; limited access to job resources is thus disadvantageous to mental health and even more so for those who feel lonely.

Moreover, loneliness negatively impacts mental health directly. This finding suggests that addressing loneliness in academia is crucial to the maintenance and boosting of mental health. This highlights the importance of fostering a supportive and connected work environment (D'Oliveira and Persico 2023) for academic researchers who may experience loneliness. Our study also provides evidence that caring responsibility is associated with lower mental health. This finding highlights the challenges faced by individuals with caregiving responsibilities and emphasises the need for policies and support structures that address their needs. Furthermore, the results show that longer years of working in academia are positively associated with mental health. Thus, hardiness may develop over time (Rice and Liu 2016) as more experienced researchers may become more adept at coping with the demands and challenges of academia. This finding underscores the importance of investing in professional development and mentoring for academic researchers. Additionally, the study reveals that the occupational category (academic staff or doctoral student) influences mental health.

Doctoral students generally report inferior mental health compared to academic staff, driven partly by suffering more loneliness and partly by experiencing a stronger negative effect from work demands on stress and mental health. These findings underscore the necessity for targeted interventions and support mechanisms tailored to the specific vulnerabilities of doctoral students.

Finally, we identify that, during Covid-19, the moderation of gender on the path from caring responsibility to stress is significantly stronger for males than females, contrary to expectation. This is a surprise as women were the main carers during Covid-19, even when men were working from home (Akanji et al. 2023). Our findings suggest that men perceived caring responsibilities as more stressful compared to women, who might be more accustomed to caregiving, aligning with the research of Harth and Mitte (2020). We speculate that this result may be due to men being pressured to take on additional caregiving responsibilities to which they were unaccustomed (Wojnicka 2022). Institutions that lack robust support systems for caregiving responsibilities may inadvertently contribute to higher stress levels in male employees who find themselves juggling work and family duties. The possibility that men and women express and report stress differently, with men potentially less likely to articulate stress until it reaches a higher threshold, should be considered (National Institute of Mental Health, 2023). These findings call for a re-evaluation of support structures in academic institutions, encouraging policies that recognize and address the unique stressors faced by male caregivers.

Limitations and future research agenda

Despite providing valuable insights, this study has some limitations. First, the cross-sectional design restricts causal inferences and the examination of mental health changes over time. Future research should employ longitudinal designs to explore causal relationships and the long-term effects of interventions. Second, the use of secondary data limits control over data collection, measurement tools, and sampling, potentially introducing biases or inconsistencies. Collecting primary data or combining primary and secondary data can address these limitations and provide a more comprehensive understanding. Third, reliance on self-report measures can introduce biases. Experimental or quasi-experimental studies investigating the effectiveness of interventions like mentorship programs and stress management workshops would offer valuable insights. Fourth, doctoral students' roles could differ across countries, which may affect the generalisability of the findings. Future research should consider comparative studies that examine the impact of cultural, institutional, and educational system differences on doctoral students' mental health and well-being. This could involve cross-country collaborations to gather and analyze data. Last, this study focuses on a limited set of predictors and moderators. Future research could investigate other factors such as organizational culture, leadership styles, and coping strategies to inform interventions and support mechanisms. Moreover, our dataset lacks in accounting for important factors related to age, wealth and other differences. Notably, doctoral students can consist of individuals who are young adults to adults who have older, more independent children and/or a previous career and therefore more wealth accumulation to withstand uncertainties caused by the pandemic, which may influence well-being. Future research should explore the above issues. By addressing these limitations and pursuing these research directions, future studies can enhance our understanding of mental health in academia and develop effective interventions to promote well-being among academic researchers.

Theoretical contributions

Notwithstanding extensive prior research on JD-R, our study contributes to the study of academic researchers' well-being and mental health by adapting and drawing upon JD-R theory as a conceptual framework. First, our findings serve to improve understanding of how job demands, life demands, and job resources interact with individual factors to influence mental health within

academia. Existing research predominantly focuses on job demands-resources and work outcomes (e.g. performance and work engagement), while the current study enriches the literature by examining their impact on mental health.

Second, the results demonstrate that stress plays a significant role in explaining the relationships between job resources-demands, and mental health, building on previous research that focuses on work-related outcomes (e.g. Lesener, Gusy, and Wolter 2019). This highlights the importance of addressing stress as a key factor in promoting mental health in academia and contributes to the literature on stress and well-being in the workplace. Prior JD-R studies have overwhelmingly adopted the general categories of variables (e.g. workload, responsibility, organizational support), yet only this current paper considers loneliness, the negative emotional state resulting from a lack of social resources.

Third, the study also highlights the moderating role of a lack of social resources (in this case, loneliness) in the relationship between job resources and mental health, distinctive from those JD-R studies on job resources (Bakker and Demerouti 2017). This finding underscores the importance of considering social factors such as loneliness when examining the impact of job resources on mental health. Moreover, our study focuses on the interplay between job resources and a lack of social resources (e.g. the positive effect of job resources on mental health is weaker if a researcher feels lonely within the academic community). Importantly, job resource itself is insufficient to support academic researchers' mental health.

Managerial implications

Academic institutions should further develop targeted interventions and support mechanisms to address the needs of academic researchers. First, this study emphasises the importance of addressing stress as a key factor influencing mental health in academia. Universities should consider implementing stress management interventions, incorporating wellness initiatives, for example, dance exercise as a proactive measure, based on insights from Vecchi et al. (2022). This approach could involve organizing dance workout sessions, and integrating dance movement therapy programs, to help academic researchers cope with stress more effectively. Second, given the moderating role of loneliness in the relationship between job resources and mental health, universities should prioritize creating a more inclusive and supportive academic culture (Ovseiko et al. 2019), and virtual networking spaces complementing physical social events. This may involve organizing social events, facilitating networking opportunities, or providing access to support groups and services. Third, caregiving responsibilities were found to be negatively associated with mental health. Difficulties faced by caregivers might be mitigated by flexible work arrangements (Fox et al. 2022) and adjustments to work–life balance (Mikołajczyk 2021). Such arrangements can be supported by technology such as remote work software like Google Workspace (https://workspace.google.com) or ClickUp (https://clickup.com) and other collaboration tools such as Miro (https://miro.com) or Mural (https://mural.co). Fourth, enhancing access to mental health resources through digital platforms like mental health apps (NHS England 2024a), online counseling services and virtual workshops on mental health awareness (NHS England 2024b) can broaden the reach and impact of support services. Chatbots programmed with cognitive–behavioral therapy techniques (botmaker 2024) could offer immediate, low-level support and guidance for managing stress and anxiety. Introducing gamified elements into wellness programs through technology can increase engagement and motivation. For example, creating challenges or milestones within a wellness app such as Headspace (www.headspace.com) or Clue (https://helloclue.com), can encourage participation in physical activity, mindfulness practices, or social events. Last, given that doctoral students experience higher levels of loneliness and stress compared to academic staff undertaking research, universities can uniquely support these students by creating internet-based virtual campuses and common rooms, establishing virtual clubs, forming virtual support groups, and implementing collaborative virtual learning environments. By integrating features that allow the use of

avatars, students can maintain anonymity. These digital interventions serve as platforms for doctoral students to share experiences, foster a sense of community, and combat loneliness, thereby enriching the virtual academic community. Incorporating software like Mural or Miro for synchronous and asynchronous discussions enables anonymous communication, offering versatile and interactive spaces for collaboration. This facilitates real-time engagement and provides ongoing, flexible support, which can also be anonymous. Such an approach ensures a secure and inclusive environment, enabling students to freely express themselves and find support, thus enhancing the doctoral student experience in the virtual academic landscape. By implementing these interventions, academic institutions can create a more supportive work environment, that fosters mental health and well-being, ultimately leading to a more resilient and productive community.

Conclusion

This study makes a significant contribution to the literature on mental health in academia by extending JD-R theory with the inclusion of stress as a mediator and loneliness as a moderator. Utilizing secondary data with 4,563 respondents, our research provides valuable insights into the complex interplay between job resources, demands, stress, and loneliness, and their impact on the mental health of academic researchers. This research underscores the importance of understanding and addressing both individual and contextual factors to promote mental health within academia. The findings highlight the need for targeted interventions and support mechanisms, particularly for vulnerable groups such as academic staff and doctoral students. By ensuring adequate job resources, addressing stress, and fostering an inclusive and supportive academic culture, universities can cultivate a resilient and productive workforce. Moreover, this study has important theoretical and managerial implications, extending the understanding of JD-R theory and shedding light on the impact of stress and loneliness on mental health in academia. The findings suggest the importance of developing interventions and support structures that enhance job resources, reduce stress, address loneliness, and provide assistance for individuals with caregiving responsibilities. In summary, this study offers a comprehensive understanding of mental health in academia by employing a substantial secondary dataset that is difficult to achieve through primary data collection alone. By identifying the unique needs of doctoral students and academic staff, and developing targeted interventions and support structures, higher education can foster a more inclusive and supportive work environment. These efforts are essential for building a resilient and productive academic community that can effectively navigate the evolving demands of academia.

Notes

1. Doctoral students are academic researchers but in this paper following UK terminology, they are not referred as academic staff. The distinction between academic staff and doctoral students is the latter are doing research for their PhD. In our sample, all of the doctoral students are full time students, i.e., none of them are part time.
2. SWEMWBS is the Short Warwick Edinburgh Mental Well-being Scale (SWEMWBS) © NHS Health Scotland, University of Warwick and University of Edinburgh, 2008, all rights reserved.

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ORCID

Akiko Ueno http://orcid.org/0000-0001-6157-3193
Chong Yu http://orcid.org/0000-0003-3877-4928
Lucill Curtis http://orcid.org/0000-0003-0533-7350
Charles Dennis http://orcid.org/0000-0001-8793-4823

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