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The impact of psychological strain on early-career academics' turnover intentions: A structural equation modeling and machine learning study

Authors:
Abdelfatah Arman[1]
Tahseen Arshi[1]
Khalid Khan[1]
Nouha Almahmoud[2]

Affiliations:
[1]Department of Management, Faculty of Business Administration, American University of Ras Al Khaimah, Ras Al Khaimah, United Arab Emirates

[2]Department of Management, School of Business Administration, Al Yamamah University, Riyadh, Saudi Arabia

Corresponding author:
Abdelfatah Arman,
abdelfatah.arman@aurak.ac.ae

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Orientation: In 2016, the Sudanese government reported that 12 149 faculty members had resigned from higher education institutions (HEIs). This study focuses on education-sector-specific psychological drivers that trigger early-career academics' (ECAs) turnover intention (TI) in developing economies.

Research purpose: This study examines academic job-specific drivers that psychologically strain ECAs' TI in developing economies such as Sudan, given the specific challenges ECAs face.

Motivation for the study: The rationale for this research stems from evident gaps in ECA's TI. Existing studies do not provide sufficient insight into education-sector-specific psychological drivers that trigger ECA's TI in developing economies.

Research approach/design and method: In this quantitative cross-lagged study, data were collected via a two-wave questionnaire administered at 6-month intervals to $N = 275$ ECAs working in Sudanese HEIs. Structural equation modeling (SEM) and machine learning were used in this study.

Main findings: The study found that academic job stressors significantly increase psychological strain, which, in turn, leads to TI. Structural equation modeling and machine learning analyses show that workload, limited growth opportunities, technology, and challenges in educational quality significantly predict psychological strain, while job embeddedness moderates the relationship.

Practical/managerial implications: One of this study's significant contributions to professional practice is that job embeddedness can serve as an antidote to challenges and hindrances related to TI.

Contribution/value-add: The study grounds the research in the challenge–hindrance model of stress (CHM) to understand the challenges and hindrances specific to the higher education sector. Contrary to some CHM assumptions that certain challenges can be motivational; this was not found to be true in the study.

Keywords: psychological strain; turnover intentions; early-career academics; higher education; structural equation modeling; machine learning.

Introduction

Persistent improvements in organisational performance depend on attracting and retaining talented employees. However, employee retention is challenging, especially in knowledge-intensive industries such as education, which incurs high costs. Employee turnover begins with the development of turnover intentions (TI), defined by Lazzari et al. (2022) as an employee's reported willingness to leave their organisation within a given time period. Turnover intention is often used to study actual employee turnover. Several work-related stressors drive TI, including demographic, economic, and psychological factors (Lazzari et al., 2022). However, the literature lacks adequate links between these stress predictors and the situational and educational context. This study examines academic job-specific drivers that psychologically strain early-career academics (ECAs). According to Arshi et al. (2021),

stress is a transactional process that results in psychological strain, which, in turn, causes TI among employees. Porter et al. (2024) hypothesised that job embeddedness (JE), which enhances employee integration, can moderate the effects of stressors by altering employees' perceptions of challenges and hindrances through social and group interactions. To assess complex dynamic interactions, the study developed multiple competing models to test causal, reversed, and reciprocal relationships between stress predictors and psychological strain.

Owusu-Agyeman (2024) indicated that ECAs are educators at higher education institutions (HEIs) who have completed their terminal degrees and have 1–5 years of teaching experience. Early-career academics are essential to HEIs as they replace retiring academics or fill vacant positions. Early-career academics bring new ideas, show enthusiasm towards work, and are the future of the educational system. In addition, HEIs expect ECAs to contribute towards organisational goals as soon as possible. Therefore, they must be nurtured and supported by HEIs.

However, in practice, HEIs witness high turnover in ECAs. Rienties and Hosein (2020) highlighted that 70% of ECAs reported work-related stress and desired to leave academia. Regrettably, the turnover of ECAs depletes human resources in HEIs of knowledge, skills, and organisational capabilities, hindering advancement towards higher standards (Calkins et al. 2019). Therefore, TIs of ECAs have attracted considerable interest among researchers, but current studies need to be more closely linked to the higher education context. The changing landscape of higher education, driven by demands for higher quality as reflected in accreditations and rankings, largely unsettles ECAs in their early careers. Unfortunately, as Mantai and Marrone (2023) pointed out, mobility is critical to career progression in education. A common belief among academics is that growth and development occur when they move into new roles.

Gürsoy and Badur (2021) developed a simulation model that describes how teaching professionals in developing economies migrate to developed economies, driven by higher remuneration and more stable career prospects. Academics in developing economies face challenges such as technology adoption, meeting international standards, rising stakeholder demands, and resource constraints (Okere et al., 2019). These pressures and psychological strain, including high workloads, weak supervision, and limited professional development budgets, lead ECAs to consider quitting. Because ECAs are crucial to educational institutions, analysing and mitigating these determinants of ECA turnover is essential.

One strategy to mitigate adverse psychological strain is JE, which is associated with organisational design factors (Shah et al., 2020). Researchers argued that if organisations are well organised and embed strategies to mitigate TI and, ultimately, employee turnover, it will reduce the adverse effects of employee turnover. When HEIs design organisations and jobs to retain employees, there is a better fit between ECAs and the organisation. On-the-JE promotes employee retention by improving employee performance and assimilation. Brindley and his colleagues examined ECAs' lived experiences in the U.K. and how they embodied their professional role as ECAs by reflecting on how to balance teaching load, research, advising, and the feeling of burnout while attempting to make a healthy work–life balance (Brindley et al., 2025). Stratford et al. (2024) found that the massive workload and psychological strain affect how ECAs view their job. They explained that job embodiment is mediated by a supportive environment in which management fosters collegiality and mentorship. The authors stressed that teaching load, research, and administrative responsibilities can lead to dissatisfaction and, eventually, TI (Stratford et al., 2024).

Theoretical background

The study uses the challenge–hindrance model of stress (CHM; Cavanaugh et al., 2000) to explain ECAs' stressors and TI. The CHM posits that work challenges and hindrances influence performance and increase psychological strain (Rosen et al., 2020). Challenges can be motivating when overcome, whereas hindrances typically induce psychological strain and negative feelings (Horan et al., 2020). When these stressors exceed ECAs' capabilities, they may lead to TI, driven by job-related challenges and a perceived loss of control.

Psychological strain is conceptualised here as the mediating mechanism linking stressors to TI, aligning with established theoretical frameworks. From a stress–strain–outcome perspective (Beehr & Newman, 1978; Katz & Kahn, 1978), stressors trigger strain, which in turn affects behavioural outcomes such as TI. Within the job demands–resources (JD–R) framework (Bakker & Demerouti, 2007), excessive job demands consume employees' energy and resources, generating strain that can lead to withdrawal intentions if resources are insufficient. Similarly, the conservation of resources (COR) theory (Hobfoll, 1989) suggests that employees strive to maintain and protect valued resources; when challenges or hindrances threaten these resources, strain arises, increasing the likelihood of turnover as a coping response.

By explicitly situating psychological strain within these broader traditions, the study enhances conceptual depth and demonstrates how CHM complements established stress frameworks. The study further aims to advance CHM by assessing the temporal stability of stressors through a cross-lagged design and two-wave data collection (Kaltiainen et al., 2019), and by exploring the role of social psychology in mitigating stressors in higher education via job engagement (Demerouti et al., 2019).

Research gap

The existing literature has examined TI in HIEs, particularly in relation to academic mobility, career progression, job satisfaction, and organisational commitment. The higher education sector is globally characterised by insecurity, mobility, and career transitions, especially among ECAs, whose career progression often depends on mobility and performance expectations (Kraimer et al., 2019). Reports from the League of European Research Universities also indicate that global higher education systems vary significantly across countries and disciplines, creating different career pressures and mobility patterns for academic staff. In dynamic, uncertain academic environments, ECAs often struggle to meet institutional demands and stakeholder expectations, as well as pressures related to career progression, which may lead to TI. Gast et al. (2022) further found that challenges and hindrances in the education sector create psychological pressures among ECAs, which may ultimately lead to TI. However, existing studies largely focus on organisational and career-related factors rather than sector-specific psychological drivers that influence TI among ECAs.

In the broader organisational and psychological literature, psychological strain has been widely studied as a consequence of job stressors such as workload, role conflict, job insecurity, and work–life imbalance. Psychological strain is known to influence employee attitudes, job satisfaction, organisational commitment, and TI across different industries. However, most studies examining psychological strain and TI are cross-sectional and conducted in corporate, industrial, or healthcare sectors rather than in HEIs. Therefore, although the general relationship between job stressors, psychological strain, and TI is established, limited research has examined how academic job-specific stressors create psychological strain and influence TI among ECAs, particularly in higher education.

More importantly, there is limited research examining academic job-related stressors and psychological strain within HEIs in developing and emerging economies. Higher education institutions in developing economies face unique structural and institutional challenges, including limited funding, large class sizes, gaps in technological infrastructure, accreditation pressures, and limited research support. Shah et al. (2020) argued that existing studies do not adequately explain education-sector-specific psychological drivers of TI among ECAs in developing economies. In many developing countries, HEIs rely heavily on ECAs due to rapid expansion and increasing student enrolment, often without proportional increases in institutional resources and academic development support. Chen et al. (2025) further found that in developing economies, the supply of highly qualified ECAs often exceeds demand, allowing HEIs to offer lower compensation packages and limited career development opportunities, which may contribute to TI. In addition, Kismono et al. (2025) highlighted that few studies have examined the moderating role of JE in regulating TI among ECAs, particularly in developing economy contexts.

Sudan represents a unique empirical setting for examining these relationships. Since 2005, under the Ministry of Higher Education regulations, Sudan has established more than 26 government-owned universities and 38 private colleges across the country, leading to the rapid expansion of the higher education sector. However, this expansion has been accompanied by significant turnover among academic staff. Reports from the Sudanese Ministry of Labour and Administrative Reform indicated that 9230 ECA staff had left their jobs by 2012, representing an 89% increase from 2008. By 2016, approximately 12 149 faculty members had resigned from HEIs, and with a total academic staff population of 34 121, the annual turnover rate was estimated at 35.6%. These figures indicate a significant turnover problem among ECAs in Sudanese HEIs. Despite this high turnover rate, empirical research on the psychological and academic job-related factors driving TI among ECAs in Sudan remains limited.

This study addresses these research gaps by examining the causal relationships among academic job-related stressors, psychological strain, and TI among ECAs, and by investigating the moderating role of JE in these relationships within the context of HEIs in a developing economy, specifically Sudan. By focusing on sector-specific academic stressors and psychological mechanisms, this study contributes to the literature on TI in higher education and provides empirical evidence from a developing economy context.

Literature review

Early-career academics and career-stage vulnerability

Scholars often use the terms 'early-career academic', 'postdoctoral researcher', and 'early-career researcher' interchangeably, although they refer to slightly different career stages depending on institutional and national contexts (Bazeley, 2003). The Association of American Universities defined ECAs as recent doctoral graduates engaged in academic work in preparation for long-term academic careers. In this study, ECAs are defined as academics who have completed their doctoral degrees and have been engaged in teaching, research, and administrative responsibilities for approximately the first 4 years of their academic careers. Early-career academics face increasing pressure to compete internationally for tenure-track positions and research funding, often against more experienced academics with established research networks and publication records (Hollywood et al., 2020).

From the perspective of the CHM, ECAs are particularly vulnerable to academic job stressors because they have limited institutional experience, weaker professional networks, and fewer organisational resources compared to senior academics. Hindrance stressors such as limited growth opportunities, administrative barriers, and resource constraints may therefore be perceived as more obstructive

by ECAs because they directly affect career progression and promotion opportunities. In addition, limited experience in managing teaching, research, and administrative responsibilities simultaneously may reduce coping capacity, making ECAs more sensitive to both challenge stressors (e.g. workload and technology adoption) and hindrance stressors. As a result, academic job stressors are more likely to translate into psychological strain among ECAs, increasing the likelihood of TI.

Academic job-specific stressors

Job-specific stressors

The job-specific stressors reported in the literature include workload, supervisory and leadership support, and a lack of growth opportunities, leading to psychological strain and ill-being (Arshi et al., 2021). Workload, a multifaceted concept encompassing time-related and mental, emotional, and physical stressors, significantly influences psychological strain (Tang & Vandenberghe, 2021). Saimima and Alam (2026) investigated work measurement as an approach utilised by organisations to assign tasks and responsibilities more efficiently, establish objective performance procedures, and evaluate employee performance. Certain job-specific stressors, such as those in academic work measurement, are very challenging. The workload related to research and teaching performance spans a significant period and is difficult to assess (David et al., 2025). These complex work requirements put pressure on academics, especially ECAs, who lack sufficient experience navigating the evolving academic landscape. It leads to workload exhaustion, which is significantly associated with stress due to unreasonable deadlines (Cao et al., 2024; Chen et al., 2025).

Employee development is another critical element that drives job-specific stressors in knowledge industries, particularly academia. Employee growth is critical to ECAs, as they must compete with well-established academics while staying up to date on curriculum and research. These growth opportunities must be supported by supervisors or leaders who enable employees to develop their skills and reach their full potential. According to Amoako et al. (2025), employee growth and development significantly improve staff engagement and reduce job-specific stressors. Without growth potential and uncertain future career progression, ECAs feel stressed and develop TI. Thus, the authors hypothesise the following:

H1: A high workload significantly impacts ECAs' psychological strain over time.

H2: The lack of growth and development opportunities significantly increases ECAs' psychological strain over time.

Technology challenges

Technology adoption and associated innovation represent a major challenge for ECAs (Autor et al., 2020). Rapid changes in educational technology and Artificial Intelligence (AI) require continuous training, skill development, and access to new technologies, which are often limited in developing economies because of resource constraints (Abdullah et al., 2016). Aleryani (2024) examined digital transformation in HEIs in developing economies and argued that HEIs need to invest in technological advancements, a process that requires government intervention and collaboration among HEIs and other stakeholders to create a framework that enables digital connectivity. International digital standards encompass the development of digital infrastructure, learning innovations, and digitally competent graduates in higher education environments.

Furthermore, according to Singun (2025), adopting digital technology in HEIs requires substantial resources to build and maintain infrastructure and to train a well-trained workforce. Artificial Intelligence technologies have also challenged the traditional comparative advantage of abundant human resources in developing economies, increasing pressure on HEIs to adopt technology-led teaching and learning systems. These technological changes create additional job demands for ECAs, including learning new technologies, adapting teaching methods, developing digital content, and managing technology-based learning platforms. From a stress-process and job-demands perspective, these technological challenges deplete psychological resources because ECAs must invest additional time, effort, and cognitive resources to adapt to technological changes while simultaneously managing teaching, research, and administrative responsibilities. This resource depletion increases psychological strain, particularly when institutional technological support and training are limited.

Therefore, technological challenges are expected to be positively associated with psychological strain, meaning that greater technological challenges will lead to greater psychological strain among ECAs over time. However, JE may buffer this relationship by providing social support, organisational fit, and access to institutional resources, thereby reducing the psychological impact of technological challenges.

Based on the review of the literature, the study proposes the following hypothesis:

H3: Technological challenges have a significant positive impact on ECAs' psychological strain over time.

Global education quality

Park et al. (2023) and Shinkafi (2020) reported that ECAs in developing economies face challenges in maintaining global educational standards in research and teaching. According to the Quacquarelli Symonds (QS) Report (2021), fewer than 1% of universities in developing economies ranked among the top 200. The pressures of research, accreditations, and rankings strain ECAs to meet international standards in higher education. In addition, all stakeholders, including parents and employers, demand higher international educational standards (Cavallone et al., 2021; Prakash, 2018). The authors found that HEIs should demonstrate

excellence in student learning, engagement, service quality, and staff and student satisfaction, all of which are critical to international quality standards. However, a lack of support, training, and resources limits ECAs' ability to integrate into HEIs, leading to psychological strain (Mejias et al., 2018; Vidal & Ferreira, 2020). Based on the literature review, the study proposes the following hypothesis:

H4: Pressure to meet global educational standards significantly impacts ECAs' psychological strain over time.

Job embeddedness

Early-career academics' psychological strain is, to a large extent, moderated by how HEIs design their human resource policies and integrate ECAs' requirements into organisational strategies. For example, JE theory posits that link, fit, and sacrifice can significantly determine employee willingness to stay or quit their jobs (Allen et al., 2016). Likewise, Shah et al. (2020) and Kiazad and his colleagues (2024) stated that JE reduces employee TI by linking job sacrifice with voluntary quitting, with the latter linked to the organisation because of perceived strong attachment and alignment with organisational culture (fit) (Kiazad et al., 2024). Organisational culture can promote employee growth and serve as an enabler of innovation (Arshi, 2013). Therefore, when organisations cannot create a culture that effectively integrates ECAs, fail to foster a sense of community and belonging, and create minimal stakeholder engagement, psychological strain and TI become more frequent and more substantial (Arshi et al., 2021; Holtom et al., 2019). Therefore, the following hypotheses are developed:

H5: Job embeddedness moderates the relationship between academic job stressors and psychological strain over time, such that the positive relationship between academic job stressors and psychological strain is weaker when job embeddedness is high and stronger when job embeddedness is low.

Psychological strain

Prior research has explained that psychological strain emerges from the stress process, in which exposure to job-specific stressors elicits emotional and psychological reactions (Arshi et al., 2021). Traditionally, workload encompassing mental, emotional, and physical stressors has been associated with psychological strain (Tang & Vandenberghe, 2021). Saimima and Alam (2026) argued that work measurements must be initiated in organisations to ensure a fair workload and avoid work-related stress. Furthermore, a lack of growth opportunities enhances work-related stressors, leading to psychological strain. According to Amoako et al. (2025), employee development reduces work anxiety, improves work security, and reduces stressors.

Empirical research on job-related stress has shown that workplace stressors significantly increase psychological strain (Baquero et al., 2025). Zhang & Lv (2014:338) defined psychological strain as 'the combined effect of several stressors manifested as frustration or suffering, psychological anxiety, and burnout'. Similarly, Postelnicu et al. (2025) emphasised that psychological strain is not only caused by workplace incidents but also by employees' emotional reactions, interpretations, and experiences of such situations.

In this study, psychological strain is treated as a latent construct representing the overall psychological response to academic job stressors, rather than a single emotional state, such as emotional exhaustion. The construct captures multiple psychological responses, including stress, anxiety, frustration, and burnout-related feelings. This approach is consistent with stress process theory, which conceptualises strain as a multidimensional psychological outcome of exposure to stressors. Therefore, psychological strain in this study represents the overall psychological burden experienced by ECAs because of academic job-related stressors.

The literature further suggests that several organisational design mechanisms can reduce employee turnover by reducing psychological strain. Job embeddedness is one such organisational mechanism that can reduce psychological strain by strengthening employees' social connections, organisational fit, and perceived cost of leaving, thereby reducing TI.

Turnover intentions

Turnover intention refers to an employee's cognitive predisposition to leave their job voluntarily and is often associated with reduced morale, productivity, and psychological withdrawal from the organisation (Lazzari et al., 2022). However, intention is not a single event but a cognitive process that develops over time. According to the belief–desire theory, individuals form intentions based on their beliefs about their current situation and their desire for a different outcome. Evaluation theory further suggests that individuals develop intentions after evaluating the expected outcomes of staying or leaving, and these intentions may take the form of proximal or distal intentions. The intending-as-doing perspective suggests that intention may progress from a mental state to an implemented course of action, as intentions often translate into behaviour when individuals form implementation plans and commit to action (Sheeran & Webb, 2016). Thus, intentionality ranges from initial cognitive consideration to actionable execution.

In the context of this study, psychological strain plays a central role in the formation of this intention. Academic job stressors create psychological strain that influences employees' beliefs about their work environment and their decisions to remain in or leave the organisation. As psychological strain increases, employees begin to evaluate the costs and benefits of continuing in the organisation or leaving. Prior research has shown that high turnover rates negatively affect the performance of HEIs and their ability to achieve strategic goals (Galan, 2023).

Furthermore, Ji et al. (2026) demonstrated that work stress and psychological strain, including burnout and work dissatisfaction, significantly increase TI. Consistent with these findings, this study proposes that academic job stressors increase psychological strain, which, in turn, leads to TI among ECAs. The study, therefore, posed a central hypothesis regarding a possible causal relationship between TI and actual turnover. Figure 1 shows the theoretical framework for the study, depicting all hypothesised relationships:

H6: Psychological strain driven by academic job-related stressors has a positive and significant effect on turnover intentions of early-career academics.

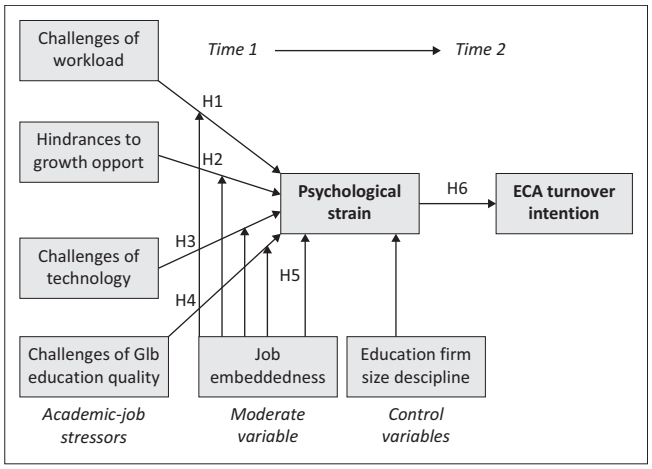
Research design

Research paradigm and approach

This study employed a primarily quantitative research approach, grounded in positivist epistemology and objectivist ontology. Organisational and behavioural phenomena, such as workload, psychological strain, JE, and TI, were conceptualised as objective realities independent of the researcher and measured using standardised instruments. The quantitative approach was selected to examine causal and reciprocal relationships among these constructs and to validate the theoretical model through statistical analysis.

A deductive research approach was adopted, deriving hypotheses from established theory and testing them using empirical data. This methodology aligns with the positivist philosophy by emphasising theory testing, measurement, and statistical analysis as central to advancing knowledge. Constructs were operationalised as measurable entities, and their relationships were empirically examined. Objective reality was assessed with minimal researcher intervention using an online 5-point Likert scale questionnaire.

A structural equation modeling (SEM), as recommended by Hair et al. (2010), was used to test the conceptual model and hypothesised relationships. Data analysis was performed usingStatistical Package for Social Sciences (SPSS, ver. 23)



ECAs, early-career academics.

FIGURE 1: Research framework.

(IBM, Armonk, NY, USA) and Analysis of Moment Structures (AMOS, ver. 23) (IBM, Armonk, NY, USA). The research design incorporated cross-lagged panel data collected in two waves, separated by a 6-month interval.

Measures

The study developed its measurement instruments by adapting from several established scales. Workload was measured using the integrated workload scale (Mathews et al., 2020), which assesses multiple dimensions, including mental demand, time pressure, and effort. This scale demonstrated high internal consistency, with Cronbach's alpha values ranging from 0.85 to 0.90.

Professional development was assessed using items adapted from Palermo and Thompson (2019) that captured employees' perceptions of growth opportunities, skill development, self-worth, and organisational support for learning. The 5-point Likert scale demonstrated strong reliability, with Cronbach's alpha values above 0.80.

Technological challenges in the workplace were measured using items adapted from the technostress scale developed by Vega-Muñoz et al. (2022). This scale evaluates challenges in technology adoption across three dimensions: Technology demands, resource support, and technology-related skills. The 5-point Likert scale exhibited high reliability ($\alpha \approx = 0.92$).

Global higher education quality was assessed using items from the higher education performance (HEdPERF) scale developed by Abdullah (2006), which captures perceived academic quality, institutional standards, teaching quality, and quality assurance processes. The 5-point Likert scale demonstrated reliability values above 0.80. Additionally, measures from the international quality standards (Ozbek, 2020) were used to link academic standards to accreditation and ranking data.

Psychological strain was measured using the standard stress scale (SSS) developed by Gross and Seebaß (2014), an 11-item instrument assessing life and social stress, including anxiety and future concerns. The 5-point Likert scale demonstrated reliability coefficients ranging from 0.71 to 0.85. Turnover intention was assessed using the TI scale (TIS-6), a 6-item scale developed by Pienaar and Bester (2011) that has demonstrated high reliability ($\alpha = 0.80$). Job embeddedness was measured using the 7-item global JE scale developed by Crossley et al. (2007), which is suitable for SEM models and has shown high reliability (0.83–0.90) and good confirmatory factor analysis fit.

Sample

The sample frame comprised ECAs employed at HEIs in the Sudanese higher education sector. A purposeful sampling approach was used to select participants. Participants completed a two-wave questionnaire survey in January 2022 (Time 1, $n = 277$) and July 2022 (Time 2, $n = 275$). In the first

wave, an online questionnaire was distributed to 397 ECAs identified through their HEIs, yielding a 69% response rate. Willingness to participate in the second wave was indicated during the first survey, and participants completed the same self-report questionnaire after a 6-month interval. In the second survey, participants reported their current TI status (still contemplating resigning, evaluating options, in the process of resigning, or resigned).

The study sample consisted of full-time, tenure-track ECAs, of whom 76% (n = 209) were male, and 24% (n = 66) were female. Participants had 1–3 years of employment in their current academic roles, and all held doctoral degrees. Their ages ranged from 36 to 43 years.

Model development

Of the four competing models, Model 1, which included autoregressive effects, demonstrated the temporal stability of the construct among the sample respondents. The high autoregressive coefficient indicated minimal deviations over time, thereby minimising any potential bias in estimation. Model 2 was developed as a causal model to predict the effects of academic job stressors on psychological strain. In Model 3, the autoregressive results with reversed effects were combined to test the temporal order of the relationships (whether psychological stress precedes academic job stressors). Finally, Model 4 assessed whether academic-job stressors and psychological strain mutually affected one another. The study combined the effects of causality and reverse causality in this mutual model. The study integrated the effects of causality and reversed causation within this mutual model. All four models are diagrammed in Figure 2.

Results

Descriptive statistical analyses

Table 1 and Table 2 present the means, standard deviations, and correlations between variables at Time 1 and Time 2, respectively. The correlations were generally in the expected directions and consistent across both time periods. The highest positive correlation was observed between strain and TI, while the strongest negative correlation was found between JE and TI. The results provide preliminary support for the hypothesised relationships and indicate no serious multicollinearity concerns. However, because of strong correlations, the authors tested for multicollinearity, which was not detected, as variance inflation factor (VIF) scores were < 0.2, indicating no inflationary effects (Tabachnik & Fidell, 2007).

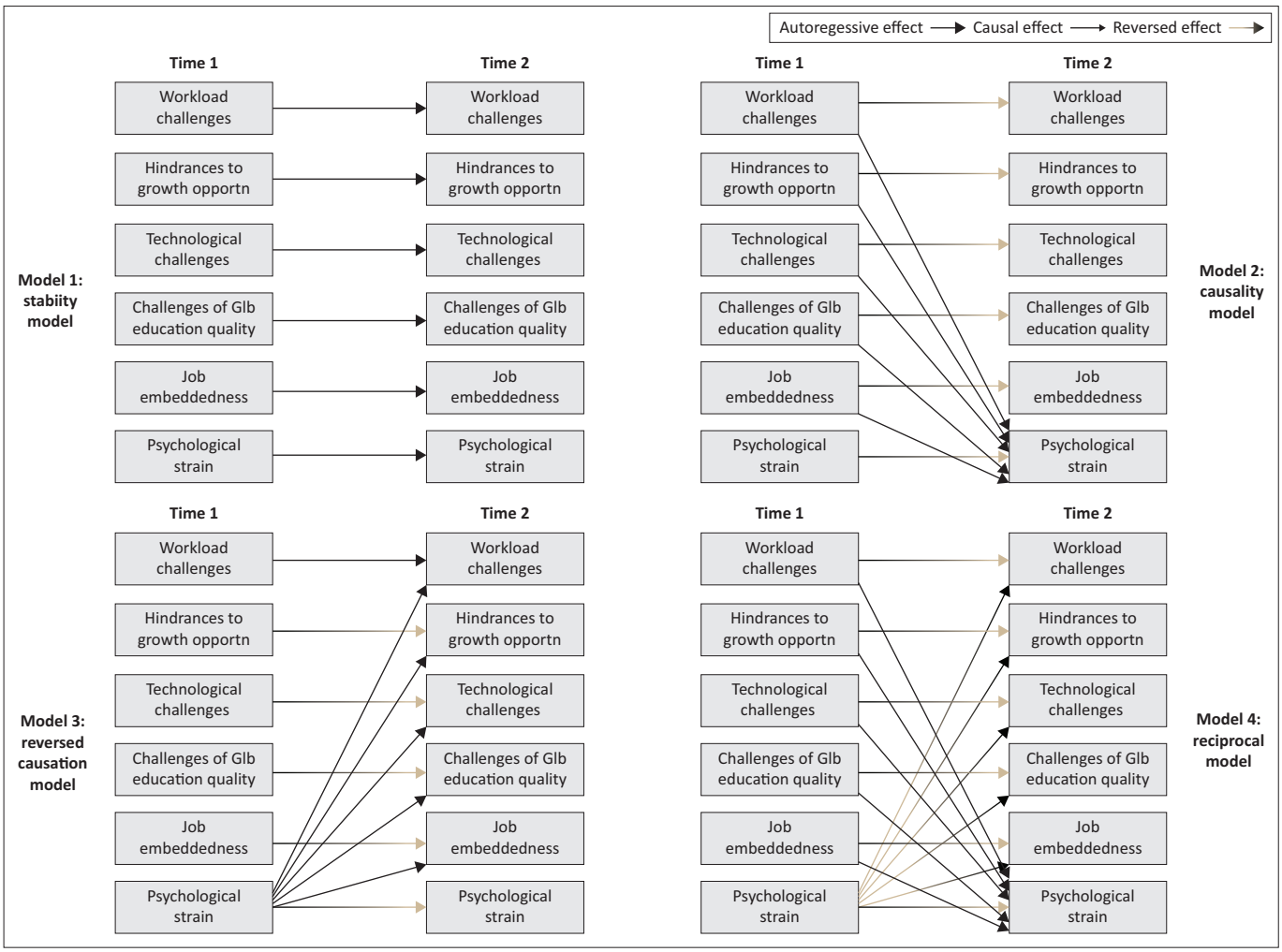


FIGURE 2: Competing models: stability, causal, reversed causal, and reciprocal models.

Furthermore, the study assessed homoscedasticity using Levene's test (Hamsici & Martinez 2007). A score > 0.05 indicated homogeneity of variance, as the sample comprised ECAs. Reliability and validity were assessed using Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). The CR was calculated using the standard formula (Equation 1):

$$CR = (\sum\lambda)2 \,/\, (\sum\lambda)2 + \sum(1-\lambda2) \quad \text{[Eqn 1]}$$

Table 3 shows that all constructs exceeded the recommended thresholds of 0.70 for CR and 0.50 for AVE, indicating adequate convergent validity.

The Fornell–Larcker criterion for assessing discriminant validity (Table 4) indicates that the square roots of the AVEs for each construct were higher than the corresponding inter-construct correlations, indicating that each construct shared more variance with its own indicators than with other constructs. Therefore, discriminant validity was established for all constructs in the model.

Examining and predicting causality

As Hair et al. (2010) suggested, the study tested a path model to assess the validity of the structural relationships in the specified theoretical model, accounting for measurement error. To examine the structural relationships among the study variables, four competing models were examined: The stability model, the causality model, the reversed causality model, and the reciprocal model. Model fit indices indicated that all models demonstrated acceptable fit; however, the reciprocal model provided the best overall fit to the data ($\chi^2 = 19.19$, df = 6, comparative fit index [CFI] = 1.00, Tucker–Lewis Index [TLI] = 1.00, root mean square error of approximation [RMSEA] = 0.00). The chi-square difference tests further indicated that the reciprocal model significantly improved model fit compared to the stability model ($\Delta\chi^2 = 19.65$, $p < 0.01$). These findings suggest that the relationships among the constructs are reciprocal rather than strictly unidirectional, supporting the logical assumption of dynamic and mutually reinforcing relationships among the study variables. Psychological strain can, in turn, hinder performance, and ECAs may perceive regular job roles as challenging. Although the reciprocal model demonstrated the best overall fit to the data, the causal model was retained for hypothesis testing based on theoretical justification and model parsimony. The reciprocal model includes additional cross-lagged paths that may improve model fit, driven by increased model complexity rather than theoretical superiority. As the hypothesised relationships were directional and based on established theory, the causal model was considered the most appropriate representation of the structural relationships among the variables. According to Kline (2023), model selection should be guided not only by statistical fit but also by theoretical plausibility and parsimony.

The results supported hypothesis 1 as workload challenges had a significant lagging effect on ECA's TI. The challenges of workload at Time 1 had a significant impact on the change of ECA's psychological strain from Time 1 and Time 2 (Table 5) (Model 2: $\gamma = 0.68$). Similarly, hindrances to growth opportunities had a lagged effect on the psychological strain, supporting hypothesis 2 (Model 2: $\gamma = 0.65$). The most significant impact was observed in technological challenges, with delayed effects on psychological strain over time: $\gamma = 0.78$ for technological challenges and $\gamma = 0.73$ for challenges to global education quality. Therefore, hypotheses 3 and 4 were supported by the results. The assumptions underlying hypothesis 5 were accurate, as JE negatively impacted psychological

TABLE 1: Means, standard deviations, and Pearson's correlations (Time 1) ($N = 275$).

Variable	Mean	SD	1	2	3	4	5	6	7
1. WRKL	3.925	0.621	-	-	-	-	-	-	-
2. GROP	4.053	0.615	0.128	-	-	-	-	-	-
3. TECH	3.997	0.505	0.049	0.132	-	-	-	-	-
4. GQS	4.050	0.667	0.281*	0.257**	0.429**	-	-	-	-
5. JE	4.091	0.589	0.504**	0.427**	0.391**	0.311**	-	-	-
6. PS	4.082	0.678	0.510**	0.455**	0.575**	0.552**	-0.667***	-	-
7. TI	4.091	0.674	0.571**	0.554**	0.585**	0.582**	-0.687***	0.714***	-

SD, standard deviation; WRKL, workload; GROP, growth opportunities; TECH, technological challenges; GQS, global quality standards; JE, job embeddedness; PS, psychological strain; TI, turnover intention.

*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

TABLE 2: Means, standard deviations, and Pearson's correlations (Time 2) ($N = 275$).

Variable	Mean	SD	1	2	3	4	5	6	7
1. WRKL	4.102	0.576	-	-	-	-	-	-	-
2. GROP	4.025	0.581	0.214	-	-	-	-	-	-
3. TECH	4.011	0.614	0.217	0.217	-	-	-	-	-
4. GQS	3.970	0.614	0.299*	0.324**	0.397**	-	-	-	-
5. JE	4.012	0.587	0.419**	0.514**	0.351**	0.347**	-	-	-
6. PS	4.017	0.612	0.587**	0.499*	0.518**	0.477*	-0.564**	-	-
7. TI	4.884	0.622	0.589**	0.598*	0.578**	0.578*	-0.594**	0.698***	-

SD, standard deviation; WRKL, workload; GROP, growth opportunities; TECH, technological challenges; GQS, global quality standards; JE, job embeddedness; PS, psychological strain; TI, turnover intention.

*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

strain (Model 2: γ = −0.48). The results indicated that higher JE is associated with lower psychological strain over time. The results are shown in Table 6.

Predicting the moderating effect of job embeddedness

Hypothesis 6 predicted that JE moderates the effect of stressors on psychological strain (Model 5). To test the moderating effect, the study first calculated workload (WRKL), growth opportunities (GROP), technological challenges (TECH), global quality standards (GQS), and JE by multiplying the z-standardised Time 1 variables and adding the interaction terms to the causal model. The results of the moderation model in Figure 2 indicate that the data fit the model well, as the fit indices met benchmark criteria (χ^2 (15) = 10.81, n.s.; CFI = 0.992; TLI = 0.991; RMSEA = 0.005).

TABLE 3: Factor loadings, alpha scores, and average variance extracted values.

Variables	Factor score	Alpha	CR	AVE
Challenges of high workload (WRKL)	-	0.71	0.83	0.501
1. My workload requires an increased emotional effort	0.69	-	-	-
2. Workloads are not standard at my workplace	0.70	-	-	-
3. I often need to work after hours to finish my work	0.69	-	-	-
4. I find my current workload does not allow for work–life balance	0.71	-	-	-
5. I find that my workload is much more than my actual teaching load	0.74	-	-	-
Hindrances to growth opportunities (GROP)	-	0.78	0.85	0.539
1. I was encouraged to learn things even if they were not related to my job	0.73	-	-	-
2. I do not see adequate growth opportunities in this job	0.65	-	-	-
3. My organisation invests in my professional development	0.75	-	-	-
4. I can fully apply my knowledge and skills to my job	0.70	-	-	-
5. My work environment allows me to feel that I am fully productive	0.68	-	-	-
Challenges of technology (TECH)	-	0.76	0.82	0.533
1. I am unable to keep pace with technological advancements	0.68	-	-	-
2. I have not been able to create digital citizenship among my students	0.69	-	-	-
3. I face resource challenges in acquiring or accessing new technologies	0.74	-	-	-
4. I am not well supported in gaining technological skills and information	0.70	-	-	-
Challenges of global higher education quality (GQS)	-	0.73	0.84	0.513
1. Pressures for accreditation and rankings create a psychological strain	0.71	-	-	-
2. It is not easy to keep pace with advancements in education quality	0.72	-	-	-
3. I am not supported in developing my skills to match global standards	0.70	-	-	-
4. I am unable to integrate high-impact teaching into my curriculum	0.72	-	-	-
5. I am expected to enhance education quality, but I lack resource support	0.75	-	-	-
Job embeddedness (JE)	-	0.73	0.80	0.501
1. I am compatible with my organisation's culture and feel connected	0.74	-	-	-
2. I am well-engaged with my organisation's internal and external community	0.77	-	-	-
3. It is difficult to leave my organisation, as it would be a high cost to me	0.77	-	-	-
Psychological strain (PS)	-	0.76	0.84	0.517
1. I feel stressed at work when I cannot perform a job due to a high workload	0.79	-	-	-
2. I feel frustrated at work when I cannot see growth opportunities	0.78	-	-	-
3. I feel anxious at work when I am not able to contribute to organisational goals	0.81	-	-	-
Turnover intention (TI)	-	0.76	0.83	0.502
1. I actively consider leaving the organisation	0.77	-	-	-
2. I am evaluating the alternatives of leaving the organisation actively	0.76	-	-	-
3. I have plans in place and will implement the actions to leave the organisation	0.79	-	-	-

CR, composite reliability; AVE, average variance extracted.

TABLE 4: Discriminant validity (Fornell–Larcker criterion).

Construct	WRKL	GROP	TECH	GQS	JE	PS	TI
WRKL	0.708†	-	-	-	-	-	-
GROP	0.214	0.734†	-	-	-	-	-
TECH	0.217	0.217	0.730†	-	-	-	-
GQS	0.299	0.324	0.397	0.716†	-	-	-
JE	0.419	0.514	0.351	0.347	0.708†	-	-
PS	0.587	0.499	0.518	0.477	-0.564	0.719†	-
TI	0.589	0.598	0.578	0.578	-0.594	0.698	0.709†

WRKL, workload; GROP, growth opportunities; TECH, technological challenges; GQS, global quality standards; JE, job embeddedness; PS, psychological strain; TI, turnover intention.
†, $p < 0.001$.

TABLE 5: Model comparison (N = 275).

Number	Model	χ^2	*df*	CFI	TLI	RMSEA	Model comparison	$\Delta\chi^2$	Δdf
1	Stability model	26.43	12	0.994	0.967	0.026	-	-	-
2	Causality model	27.45	9	0.992	0.988	0.044	1 vs. 2	29.89***	3
3	Reversed model	12.82	9	0.983	0.956	0.049	1 vs. 3	8.58*	3
4	Reciprocal model	19.19	6	1.000	1.000	0.000	1 vs. 4	19.65**	6
-	-	-	-	-	-	-	2 vs. 3	7.31	0
-	-	-	-	-	-	-	2 vs. 4	8.46	3
-	-	-	-	-	-	-	3 vs. 4	13.77**	3

df, degrees of freedom; CFI, comparative fit index; TLI, Tucker–Lewis Index; RMSEA, root mean square error of approximation.
*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

TABLE 6: Parameter estimates of the path models (N = 275).

Variables	Model 2: Causality model		Model 5: Moderation model	
	Γ	SE	γ	SE
Autoregressive effects				
Challenges of high workload	0.65**	0.04	0.70**	0.03
Hindrances to growth opportunities	0.61**	0.03	0.76**	0.02
Challenges of technology	0.77***	0.01	0.69**	0.01
Challenges of education quality	0.71***	0.01	0.59**	0.03
Job embeddedness	0.47**	0.05	0.64**	0.05
Psychological strain	0.66**	0.05	0.61**	0.05
Predicting psychological strain (Time 2)				
Challenges of high workload (Time 1)	0.68**	0.02	0.69**	0.04
Hindrances to growth opportunities (Time 1)	0.65**	0.03	0.71**	0.03
Challenges of technology (Time 1)	0.78***	0.02	0.77**	0.02
Challenges of education quality (Time 1)	0.73***	0.04	0.68**	0.04
Job embeddedness (Time 1)	-0.48	0.05	-0.47	0.05
Challenges of high workload × job embeddedness (Time 1)	-	-	-0.37**	0.04
Hindrances to growth opportunities × job embeddedness (Time 1)	-	-	-0.31**	0.04
Challenges of technology × job embeddedness (Time 1)	-	-	-0.39**	0.03
Challenges of Education Quality × Job Embeddedness (Time 1)	-	-	-0.41**	0.05

Note: Time 1 variables (predictors) were used to predict psychological strain at Time 2.
**, $p < 0.01$; ***, $p < 0.001$.
SE, standard error.

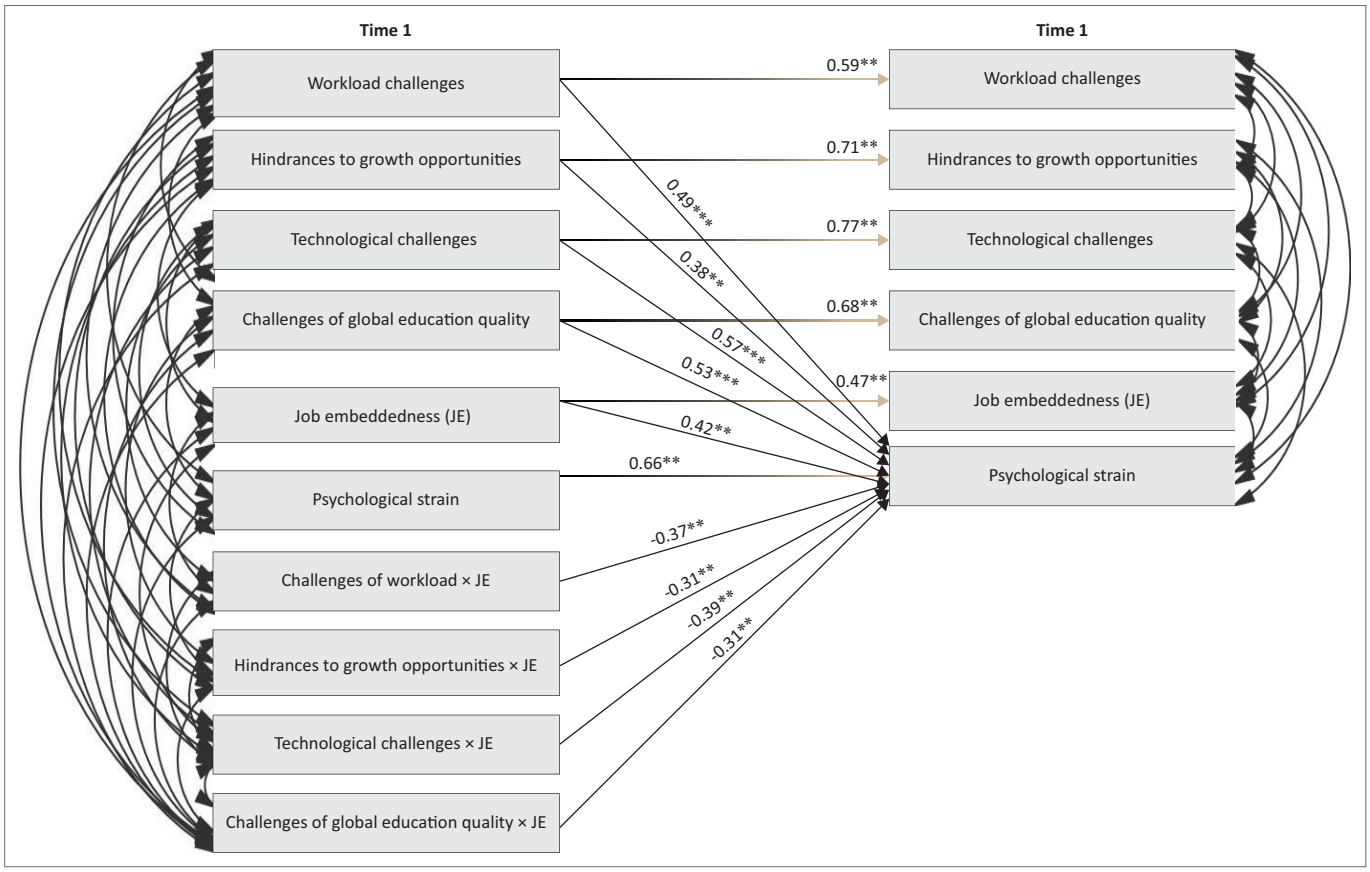
The path model results presented in Table 6 show significant autoregressive effects for all study variables, indicating strong temporal stability between Time 1 and Time 2. In the causality model, all challenge stressors significantly predicted psychological strain at Time 2, suggesting that these workplace challenges increase employee psychological strain over time. Job embeddedness was negatively related to psychological strain, indicating that more engaged employees experience lower levels of psychological strain.

The moderation model further revealed significant interaction effects between JE and all challenge stressors. The negative interaction effects indicate that JE buffers the positive relationship between workplace challenges and psychological strain. Specifically, the relationships among workload, growth hindrances, technology challenges, education quality challenges, and psychological strain weaken when JE is high. These findings support JE's buffering role in reducing the negative psychological effects of workplace stressors (Table 6, Figure 3).

Furthermore, slope analysis was performed to confirm the moderation result. The test involved controlling for the baseline level of JE at Time 1, enabling the model (with autoregressive effects) to predict inter-individual differences in the development of psychological strain from Time 1 to Time 2. The test involved controlling the baseline level of JE at Time 1, enabling the autoregressive model to predict inter-individual differences in the development of psychological strain from Time 1 to Time 2. The results showed that when JE was high, increases in work-related stressors – high workload, hindrances to growth opportunities, and technology challenges – did not significantly increase psychological strain ($\gamma = -0.03$, n.s.; $\gamma = -0.02$, n.s.; $\gamma = -0.01$, n.s.), indicating a buffering effect of JE.

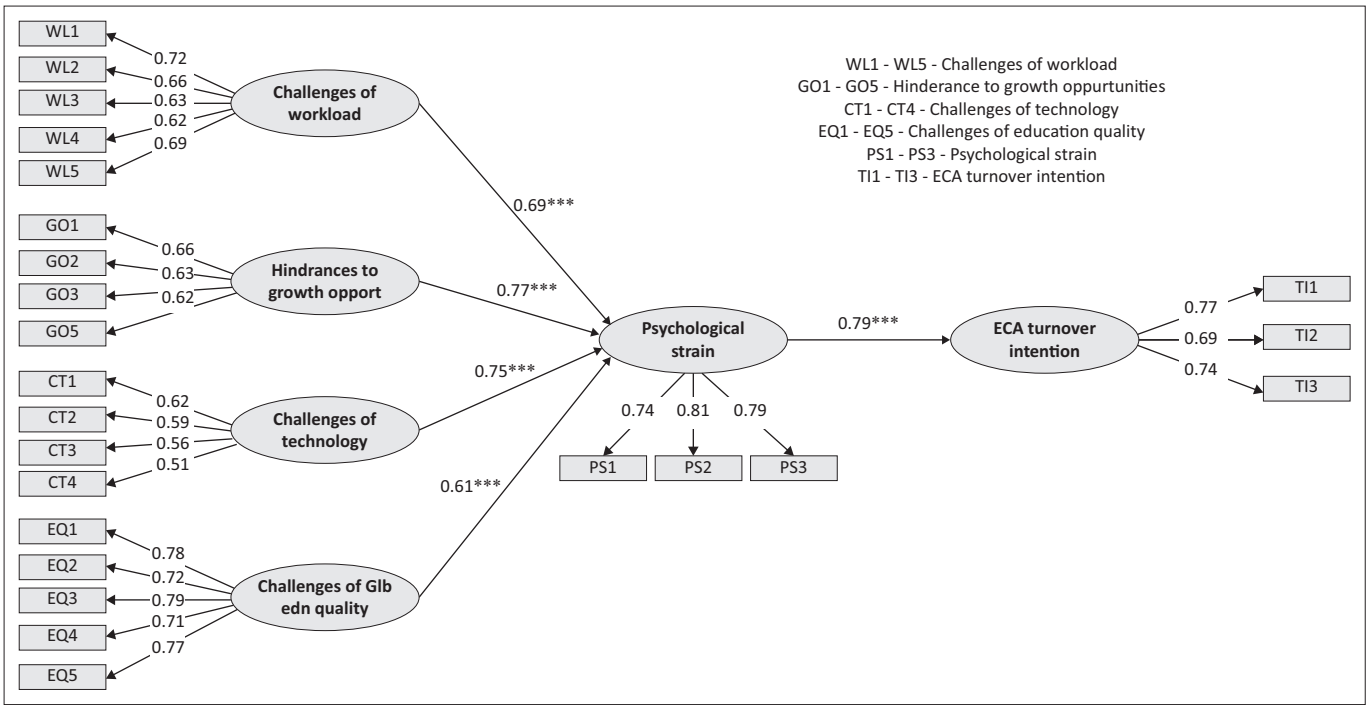
In contrast, when JE was low, increases in these stressors were associated with significant increases in psychological strain over time. Specifically, the slopes for high workload ($\gamma = 0.19$, $p < 0.05$), hindrances to growth opportunities ($\gamma = 0.24$, $p < 0.05$), and technology challenges ($\gamma = 0.29$, $p < 0.05$) were significant, indicating that psychological strain increased more strongly when JE was low. These results indicate that the change in psychological strain between Time 1 and Time 2 varied across employees, depending on JE level, with larger increases in strain at lower levels. Thus, the data fully support hypothesis 5.

Finally, the study examined the full structural model using a full SEM path model (Figure 4) to test the effects of academic job-related stressors (high workload, hindrances to growth opportunities, technology challenges, and education quality challenges) on psychological strain, which, in turn, influenced ECAs TI.



Note: Parameter estimate of moderation model (lagged effect). Black paths represents cautions paths, grey paths represent autoregessive effects.
*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

FIGURE 3: Moderation model.



ECAs, early-career academics.

*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

FIGURE 4: Default structural equation modeling path model.

Furthermore, the study balanced precision and recall using the F1 score, calculated as F1 = 2 × (PRE × REC)/(PRE + REC). Both precision (PRE) and recall (REC) range from 0.0 to 1.0, with values closer to 1.0 indicating better predictive performance. The receiver operating characteristic (ROC) curve in Figure 5 illustrates the model's accuracy in predicting ECAs TI given psychological strain, with an area under the curve (AUC) of 0.976 at the optimal threshold. The structural path results indicate that work-related stressors – workload (WRKL = 0.69), hindrances to growth opportunities (GROP), technology challenges (TECH), and institutional education quality challenges (IEQ) – predict psychological strain, which in turn predicts TI, confirming the indirect causal chain from stressors to TI via psychological strain. Additionally, cross-validation results confirm the model's generalisability and predictive robustness, indicating that it performs well not only on goodness-of-fit but also on out-of-sample prediction.

The model achieved the highest accuracy for the belief–desire component of TI, with an AUC value of 0.989 using the gradient boosting classifier (Figure 5a). Accuracy for evaluating alternatives to leave the organisation was 0.927, and for implementing the action plan to leave, 0.912, both using the decision tree classifier (Figure 5b and c, respectively). These findings indicate that different algorithms were employed to model distinct facets of TI, each demonstrating strong predictive performance. Macro-precision and F1 scores were corroborated by cross-validation results, indicating consistency between the training and test datasets and confirming the model's robustness. Parameter values and performance metrics, including weighted and macro measures, are presented in Table 6.

Discussion

Early-career academics face unique challenges during career transitions, particularly within HEIs. The decision to remain in or leave an academic position is highly stressful. Although the higher education sector is complex and competitive, previous studies have not sufficiently considered education-specific and situational factors affecting ECAs compared to established academic staff. Furthermore, the psychological processes underlying ECAs' intentions to leave their positions remain underexplored. Prior research, largely cross-sectional, has not adequately examined academic job-related stressors in developing and emerging economies. This study addressed these gaps by examining specific academic job stressors, their causal relationship with psychological strain, and their ultimate effect on TI among ECAs.

The results of the SEM confirmed that academic job-related stressors have a significant causal effect on psychological strain, which, in turn, leads to TI. The SEM path coefficients demonstrated that workload, hindrances to growth opportunities, technology challenges, and education quality challenges all significantly predicted psychological strain, and psychological strain significantly predicted TI. These findings suggest that academic job stressors create deprivation and aspirational strain among ECAs, which gradually develops into psychological strain and ultimately TI. The model also revealed reciprocal effects between academic job stressors and psychological strain, indicating that when ECAs experience higher psychological strain, they perceive stressors more negatively, which further exacerbates stress and suppresses motivation, thereby reinforcing TI.

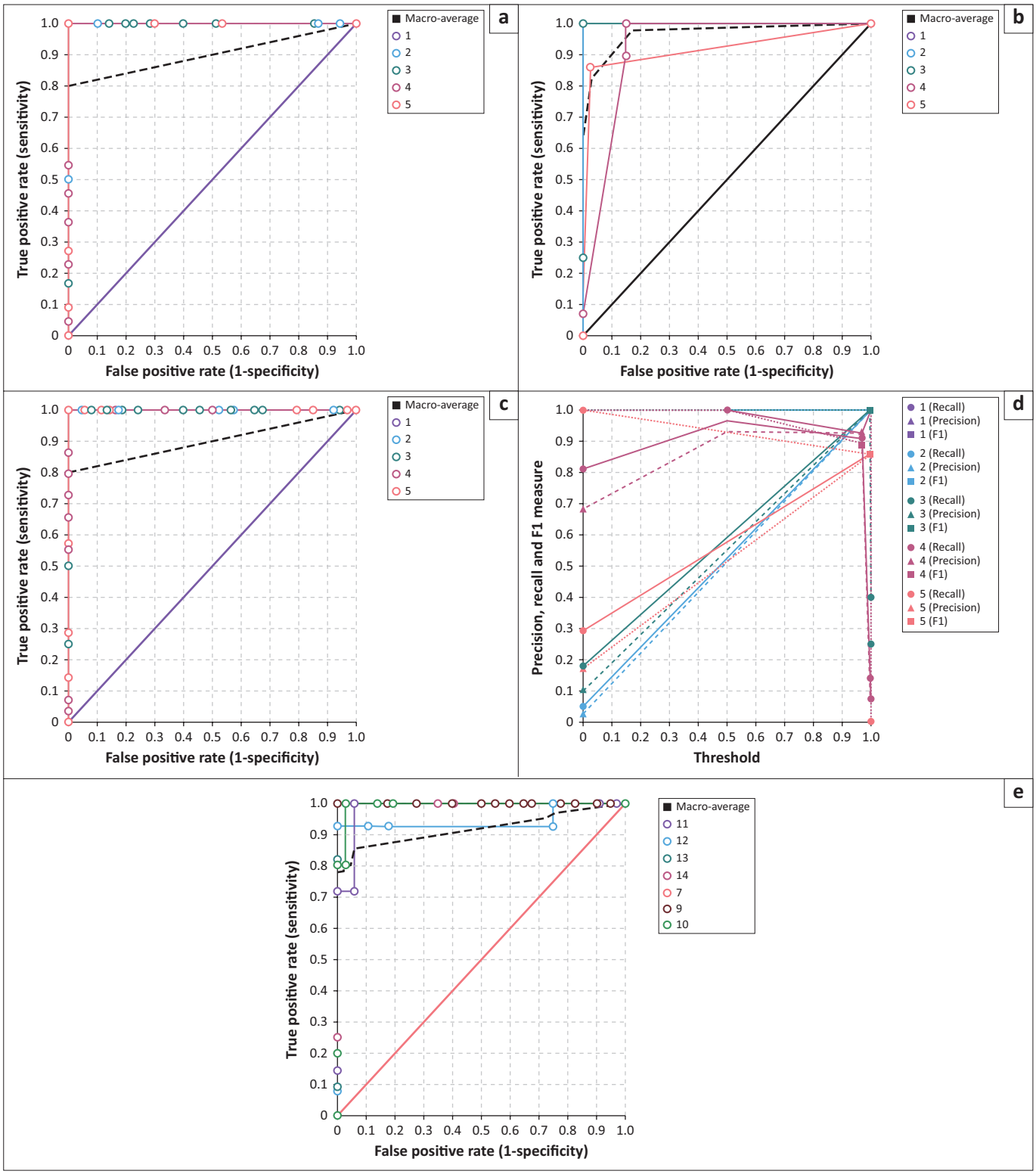


FIGURE 5: Receiver operating characteristic and area under the curve graphs predicting the probability of the effect of psychological strain on early-career academics turnover intentions: (a) Gradient boosting classifier; (b) Decision tree classifier; (c) Decision tree classifier; (d), Macro-precision measures; (e), Cross-validation results.

Psychological strain was found to significantly affect the belief–desire component of TI, representing a cognitive state in which employees begin considering leaving but may not yet have implemented an action plan. Organisational intervention, particularly JE, plays a critical role in altering this psychological state. The moderation results showed that JE significantly buffered the relationship between academic job stressors and psychological strain. The slope analysis indicated that when JE was high, increases in academic job stressors did not significantly increase psychological strain. In contrast, when JE was low, stressors significantly increased psychological strain over time. This finding confirms JE's buffering role and highlights its importance in reducing TI among ECAs.

Consistent with prior studies (e.g. Hollywood et al., 2020; Nästesjö, 2021; Rienties & Hosein, 2020), the findings suggest that uncertainty about academic roles, career identity, aspirations, and career progression contributes to stress-related intentions to quit among ECAs. This study further identifies key stressors specific to HEIs, particularly in developing and emerging economies, including high workloads, limited growth opportunities, technological challenges, and pressures on educational quality related to accreditation and rankings.

Workload challenges are particularly significant in higher education because workload is determined not solely by working hours but also by student load, class size, teaching preparation, administrative work, and research expectations. Early-career academics are often assigned entry-level courses with large class sizes, which require more preparation, grading, and student support compared to senior courses. In developing economies, large class sizes are often driven by resource constraints and high student-to-staff ratios, which increase workload pressure and psychological strain among ECAs. Therefore, workload in higher education should be evaluated not only in terms of teaching hours but also in terms of student load and administrative and research responsibilities.

Growth opportunities represent another major stressor for ECAs. Limited institutional budgets, restricted research funding, and insufficient pedagogical training constrain ECAs' ability to develop teaching and research capabilities. Early-career academics are often evaluated using the same performance standards as those established for academics, even as they continue to develop their teaching, research, and service competencies. The lack of adequate support in teaching development, research funding, and mentoring leads to psychological strain and contributes to TI. These findings support the significant positive relationship between hindrances to growth opportunities and psychological strain observed in the SEM results.

The study also identified technological challenges and global pressures on higher education quality as stressors particularly relevant to HEIs in emerging and developing economies. Rapid technological change, digital learning platforms, and the integration of AI into education have created gaps in technological skills among ECAs, especially where institutional resources and training are limited. Early-career academics face challenges related to technology adoption, training availability, and institutional investment in digital infrastructure. The SEM results showed that technological challenges significantly increased psychological strain, confirming that technological readiness is now a critical factor influencing academic job stress and TI.

Similarly, pressures to improve educational quality, driven by accreditation and global rankings, create additional stress for ECAs. Accreditation standards and ranking systems require high performance in teaching, research, and service, yet they often do not differentiate between early-career and senior academics. Early-career academics are therefore expected to contribute equally to institutional performance indicators despite being in the early stages of their careers. This expectation creates performance pressure, psychological strain, and, eventually, TI among ECAs who struggle to meet it.

Job embeddedness plays a critical protective role by reducing psychological strain and TI. Job embeddedness strengthens employees' belongingness to their organisation through social relationships, organisational fit, and the perceived costs of leaving. The moderation results and slope analysis confirmed that higher JE weakens the relationship between academic job stressors and psychological strain. In academic environments, creating scholarly communities, mentoring systems, collaborative research groups, and social integration opportunities can strengthen JE, reduce psychological strain, and lower TI. When ECAs feel socially and professionally connected to their institution, the perceived cost of leaving increases, thereby reducing turnover.

Overall, this study contributes to the literature by demonstrating a clear causal chain: Academic job stressors lead to psychological strain, psychological strain leads to TI, and JE buffers the relationship between stressors and strain. The combination of SEM results and machine learning predictive accuracy, as indicated by high AUC values, further confirms the model's robustness and predictive validity. These findings indicate that academic job stressors and psychological strain are strong predictors of ECA TI.

Conclusion

Implications for theory development

The study grounds its research in CHM theory to understand challenges specific to higher education. Contrary to CHM theory's assumption that some challenges can be motivational, the study found this not to be true. Psychological strain hinders ECAs' motivation to tackle challenging assignments. For instance, workload, technological challenges, quality of education, and growth opportunities negatively impact the performance of ECAs. Therefore, the implication for theory development concerning CHM, in light of ECA's TI, is that under psychological strain, challenges rarely enhance performance and mostly constrain it. This dichotomy is more pronounced when institutions have limited control over their workloads, resources, and policies. While some ECAs may find opportunities within these challenges, this is an exception rather than the general rule.

The CHM model, primarily studied for its impact on performance, found that challenges and stressors predict psychological strain and TI. The cross-lagged model showed that the effects of stressors on psychological strain and TI were stable over time, thereby validating the study's predictive variables. It also demonstrated that challenges and hindrances are stable stressors that can be moderated through

social psychology-driven organisational strategies. Finally, the study used a mix of well-established and context-specific stressors relevant to higher education to develop TI theory. It showed that sectoral-specific models are essential for future TI studies, as general models are not applicable in all sectors.

Implications for professional practice

One significant contribution of this study to professional practice is that it offers an antidote to challenges and hindrances to TI-related through job-embedded social psychology. When HEIs design organisations with the objective of employee retention, it can effectively offset TI and, ultimately, employee turnover. It begins with developing an organisational culture of support, development, and family orientation, creating a sense of belonging. Organisations with high levels of JE make it easier to build connections with internal and external stakeholders, making it psychologically costly for ECAs to leave. Psychologically, the challenges and hindrances are, after all, appraisals. Higher education institutions can mitigate challenges and hindrances by altering psychological perceptions through strong bonds and fostering a culture of community and belonging.

Limitations and future research directions

The study tested a selection of the most prominent traditional and HEI-specific variables to examine their combined effects on psychological strain and TI. However, other, less prominent stressors could not be included to maintain a testable model. Similarly, the study considered JE as one of the most prominent moderators of this relationship, as supported by the literature. Future studies can examine several other stressors and TI drivers, such as role conflict, work–life balance, and supervisory support, to assess their combined effects on ECA TIs. Similarly, future research could also examine other positive psychology moderators, such as emotional intelligence or psychological capital.

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This manuscript is based on a conference abstract. This article is based on research previously presented in abstract form at a conference held in Kuala Lumpur on 11–12 September 2024. The abstract has since been developed into a full manuscript, which has been expanded and revised for journal publication. This republication is completed with permission from the conference organisers. You may have noticed that two authors are different from the ones in the abstract due to the fact that we had received lengthy feedback at the conference, and they had decided not to further develop the article, and I had worked with other colleagues to develop this abstract in a fully developed article.

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

CRediT authorship contribution

Abdelfatah Arman: Conceptualisation, Data curation, Investigation, Methodology, Project administration, Supervision, Writing-original draft. Tahseen Arshi: Conceptualisation, Formal analysis, Investigation, Methodology, Software, Writing-review & editing. Khalid Khan: Investigation, Methodology, Project administration, Visualisation. Nouha Almahmoud: Formal analysis, Validation, Writing-review & editing. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication, and take responsibility for the integrity of its findings.

Ethical considerations

This research followed the accepted ethical standards for research involving human subjects who participated in the survey. The ECA respondents were included voluntarily, and informed consent was obtained after they were fully informed of the study's purpose. Since they might be at a delicate stage in their careers, care was taken to ensure that their involvement did not endanger their professional status, and the respondents were free to withdraw at any time. No information was collected that could identify the respondents, and all responses were analysed in aggregate to ensure anonymity and confidentiality. The survey questions were formulated to minimise discomfort among respondents, especially when they addressed work-related experiences. All data were kept securely and used solely for academic purposes, in accordance with institutional ethical principles. IRB approval was obtained from American University of Ras AJ Khaimah.

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Data availability

The data that support the findings of this study are not openly available because of reasons of sensitivity and are available from the corresponding author, Abdelfatah Arman, upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. They do not necessarily reflect the official policy or position of any affiliated institution, funder, agency, or the publisher. The authors are responsible for the article's results, findings, and content.

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