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Structural Model of Imposter Syndrome and Techno-Stress on Faculty Job Burnout: Mediating Role of Digital Work Addiction and the Moderating Role of AI Literacy

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ABSTRACT

Objective: Higher education in the AI era faces a paradigmatic rupture, exposing faculty to novel psychological challenges. This study aimed to develop and test a structural model examining how imposter syndrome and techno-stress affect faculty job burnout, with digital work addiction as a mediator and AI literacy as a moderator.

Methods: This applied, correlational study employed structural equation modeling (SEM). The statistical population comprised all full-time faculty at Tehran's public universities (~7,500 individuals) in the 2024–2025 academic year; 400 were selected via stratified random sampling. Instruments included: Maslach's Burnout Inventory (1996), Clance's Imposter Phenomenon Scale (1985), Tarafdar's Techno-Stress Inventory (2007), Digital Work Addiction Scale (2017), and AI Literacy Scale (2024). Data analysis was conducted using SPSS-27 and AMOS-26.

Results: Results indicated significant direct effects of techno-stress and imposter syndrome on job burnout. Digital work addiction fully mediated the pathways from technological stress and internal doubts to burnout. Multi-group analysis in AMOS confirmed AI literacy's significant moderating role: among faculty with high AI literacy, the harmful impacts of techno-stress and imposter syndrome on digital work addiction and subsequent burnout were significantly reduced.

Conclusions: AI literacy transcends technical proficiency and functions as a psychological protective buffer. Universities are advised to prioritize capacity-building strategies grounded in critical AI literacy and sustainable digital well-being protocols to prevent burnout and safeguard faculty mental health.

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Introduction

The higher education system worldwide is undergoing an unprecedented paradigmatic rupture: the traditional role of faculty members has shifted from absolute knowledge authorities to continuous, technology-driven facilitators. Although this rapid transition has opened new horizons in teaching and research, it paradoxically threatens faculty members' psychological well-being and occupational sustainability—manifesting as severe occupational burnout.

In contemporary academic settings, burnout is no longer merely fatigue from excessive workload; it signifies pervasive emotional exhaustion, professional identity distortion, and chronic feelings of personal ineffectiveness—rooted in digital structural transformations (Maslach & Leiter, 2022; Wang et al., 2024). International reports (2024–2025) reveal a psychological tsunami in universities: burnout rates among top-tier global faculty exceed 65%, while in Iran, Dr. Mohsen Gholipour's (2024) study reports ~72%—driven by economic pressures intersecting with stringent digital academic promotion requirements.

This crisis has caused a 54% decline in faculty–student interaction quality and a sharp drop in original scholarly output, while triggering a new wave of elite attrition and emotional resignation—challenging the university's structural viability as a hub of ideation.

Internally, the psychological phenomenon of the imposter syndrome has emerged as a key predictor of this disintegration—especially amplified in the era of digital transparency and scientometric platforms. Faculty suffering from this syndrome, despite brilliant records and credible credentials, struggle to internalize success and endure constant fear of being exposed as academic fraud (Brewer et al., 2020). According to Patel's (2025) longitudinal study, 48% of faculty feel their knowledge is misaligned with the rapid pace of technological advancement—particularly AI—due to relentless digital competition and persistent social comparison on professional networks. This academic identity crisis forces them to endure excessive workloads to maintain perfectionist facades and prove competence, ultimately leading to motivational burnout and premature exhaustion. Indeed, imposter syndrome acts as a catalyst, transforming routine workplace stress into existential crises—leaving no viable escape route.

Concurrently, techno-stress—a new, widespread environmental and structural epidemic—has ensnared faculty in the vortex of emerging technologies. Techno-stress is not merely difficulty using new tools; it encompasses techno-intrusion (complete blurring of home–university

boundaries) and techno-overload (relentless information bombardment), making faculty feel perpetually monitored and digitally on standby (Tarafdar et al., 2024). As Li et al. (2025) found, mandatory real-time AI tool adoption and constant LMS (Learning Management System) shifts induce chronic anxiety, severe mental fatigue, and physical performance decline.

This double pressure—internal (imposter syndrome) and external (techno-stress)—pushes faculty toward a maladaptive defense mechanism: digital work addiction. As defined by King (2025), this behavioral disorder stems from presence anxiety and manifests as compulsive, obsessive engagement in online academic activities—even during rest or late-night hours. Such pathological involvement is not driven by scholarly passion but by attempts to compensate for perceived inadequacy (from imposter syndrome) and to avoid technological obsolescence (from techno-stress) (Spagnoli et al., 2023). Digital work addiction denies the mind any opportunity for psychological detachment—a condition Smith et al. (2024) identified in *Journal of Occupational Health Psychology* as the shortest path to full burnout and nervous system collapse. Within this futile cycle, faculty work more to reduce stress—yet this intensified digital labor becomes the very source of renewed stress and burnout.

Amid this digital-induced deadlock, this study's necessity lies in identifying the critical role of AI literacy. In this model, AI literacy is not merely technical proficiency with tools, but a multidimensional, strategic capacity: critical understanding, emotional regulation, and strategic use of AI to streamline workflows and reduce psychological burden (Long & Magerko, 2020). Recent studies (Chen & Li, 2025) confirm AI literacy functions as a protective buffer: faculty with high AI literacy perceive technology not as a threat to identity (avoiding imposter syndrome) nor as unbearable pressure (avoiding techno-stress), but as a powerful assistant. This mindset enables them to disengage from addictive digital behaviors and redirect psychological resources toward creative, value-generating work.

Thus, this research aims to construct a comprehensive structural model to answer this pivotal question: How can strengthened AI literacy disrupt the destructive chain of digital stress → addiction → burnout in Iranian academia? In this conceptual model, AI literacy acts as a moderator, weakening the negative impact of techno-stress and imposter syndrome on digital work addiction—and indirectly safeguarding faculty psychological well-being.

Since prior studies largely treat AI literacy as a purely technical skill, the novelty of this research lies in framing it as a defensive-psychological variable. Ultimately, findings can inform organizational interventions, flexible academic promotion standards, and practical strategies to preserve faculty mental health in the AI era. The necessity of this study arises from the concern that if universities move rapidly toward AI-ification (intelligentization) without considering this variable, they will undoubtedly face a new generation of job burnout crisis that may become irreversible.

Material and Methods

This study adopted a descriptive-survey design within the framework of correlational research. The primary objective was to explain the causal relationships among imposter syndrome, techno-stress, and job burnout, with digital work addiction as a mediating variable and AI literacy as a moderating variable, using structural equation modeling (SEM).

The statistical population comprised all full-time faculty members at public universities in Tehran, estimated at approximately 7,500 individuals based on the latest official statistics. A stratified random sampling method was employed: the population was first stratified by university type (technical, basic sciences, humanities, etc.), gender, and academic rank (assistant professor, associate professor, full professor), and then participants were randomly selected from each stratum in proportion to its share in the overall population to ensure sample representativeness.

Given that data analysis was conducted using SEM via AMOS software, the minimum sample-size requirements for complex models were prioritized. According to Klein (2023) and Heer et al. (2024), in models involving both mediating and moderating variables, the ratio of sample size to the number of indicator items should be at least 10:1. Considering the total number of items across all instruments, a final sample size of 400 was selected. This number not only ensured adequate model fit but also provided high precision in estimating key parameters, including factor loadings and path coefficients.

Instruments

Maslach Burnout Inventory (MBI-GS): The first instrument was the Maslach Burnout Inventory (1996), assessing psychological exhaustion among faculty across 16 items on a 7-point Likert scale (0 = *never* to 6 = *every day*). Clinical cut-off points were applied: mean scores > 3.2

on *exhaustion* and *cynicism* dimensions, and < 4 on *professional efficacy*, indicated high burnout levels. Construct validity was confirmed via confirmatory factor analysis (CFA) in AMOS, yielding acceptable fit indices ($GFI > 0.90$, $CFI > 0.90$). Internal consistency was strong (Cronbach's $\alpha = 0.89$).

Clance Imposter Phenomenon Scale (CIPS): The 20-item CIPS (1985) measured imposter feelings on a 5-point scale (1–5), yielding total scores between 20 and 100. Standardized cut-offs: ≤ 40 (minimal), 41–60 (moderate), 61–80 (frequent), > 80 (severe imposter syndrome). Content validity was verified by experts, and reliability was confirmed via test-retest and Cronbach's α ($\alpha = 0.91$). CFA showed factor loadings ranging from 0.62 to 0.84; composite reliability ($CR = 0.87$) and Cronbach's α (0.91) confirmed measurement precision.

Tarafdar Techno-Stress Scale (TCS): The 15-item TCS (2007) assessed technology-induced stress across three dimensions: *techno-overload*, *techno-invasion*, and *techno-insecurity*. Responses were recorded on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*), with higher scores indicating greater stress. A mean score > 3.5 was used as the crisis threshold. CFA confirmed construct validity, with average variance extracted ($AVE > 0.50$) and $CR > 0.70$ across dimensions. Internal consistency was high ($\alpha > 0.82$).

Digital Work Addiction Scale (DWA): Adapted from Quinones et al. (2017), the 12-item DWA assessed compulsive digital behaviors. Responses ranged from 1 (*never*) to 5 (*always*). A total score > 48 (mean > 4.0) indicated pathological digital dependency. Face validity was established through forward and backward translation by experts, and reliability was confirmed ($\alpha = 0.84$).

AI Literacy Scale (AIL): Based on Nguyen et al. (2024), the 18-item AIL measured faculty competencies across four dimensions: *AI knowledge*, *practical application*, *critical evaluation*, and *ethical considerations*. Responses followed a 5-point Likert scale. No clinical cut-off was predefined; instead, a statistical cut-off (sample mean) was used to categorize participants into *high* and *low* AI literacy groups for moderation analysis. CFA confirmed item loadings > 0.60 , and internal consistency was excellent ($\alpha = 0.92$).

Data Analysis

Data analysis was conducted at two levels:

Descriptive statistics (means, SDs, skewness, kurtosis) using SPSS-27;

Inferential analysis via SEM using AMOS-26.

Mediation of digital work addiction was tested using the bootstrapping method (5,000 resamples). Moderation by AI literacy was examined through multi-group analysis (MGA), comparing path coefficients between high- and low-AI-literacy groups. All statistical tests were conducted at $p < 0.05$.

Ethical Statement

This study was conducted in strict compliance with international ethical standards for social and behavioral research, including the Declaration of Helsinki and the American Psychological Association (APA) Ethical Guidelines. All participants were fully informed about the study's purpose, procedures, potential risks and benefits, and their right to withdraw at any stage without penalty. Written informed consent was obtained from every respondent prior to participation. Anonymity and confidentiality of responses were rigorously ensured: no personally identifiable information was collected, and all data were stored in encrypted, access-restricted databases accessible only to the research team.

Results

Descriptive Statistics of the Study Variables

Initially, descriptive statistics including mean, standard deviation, skewness, and kurtosis were calculated for the main study variables. The results are presented in Table 1. The skewness and kurtosis values for all variables fell within the acceptable range of ± 2 , indicating that the data distributions were approximately normal and suitable for Structural Equation Modeling (SEM) analyses.

Table 1. Descriptive statistics of the study variables (n = 400)

Variable	Mean	Standard Deviation	Skewness	Kurtosis
Impostor Syndrome	3.42	0.71	0.41	-0.58
Techno-Stress	3.67	0.76	0.36	-0.49
Digital Work Addiction	3.51	0.69	0.27	-0.62
Artificial Intelligence Literacy	3.28	0.73	-0.33	-0.41
Job Burnout	3.46	0.74	0.39	-0.55

An examination of the indices reported in Table 1 shows that the mean values of all study variables are above the midpoint of the scale. Furthermore, since the skewness and kurtosis values of all core variables (impostor syndrome, techno-stress, digital work addiction, AI literacy, and job

burnout) fall within the standard acceptable range (± 2), the assumption of normality was satisfied. This finding provides the necessary statistical foundation for the use of parametric inferential statistics, particularly Structural Equation Modeling (SEM).

In the next step, Pearson correlation coefficients were calculated to examine the preliminary relationships among the variables. The results are presented in Table 2.

Table 2. Pearson correlation matrix of the study variables

Variable	1	2	3	4	5
1. Impostor Syndrome	1				
2. Techno-Stress	0.41**	1			
3. Digital Work Addiction	0.46**	0.52**	1		
4. AI Literacy	-0.29**	-0.31**	-0.34**	1	
5. Job Burnout	0.48**	0.55**	0.51**	-0.37**	1

**p < 0.01

The results indicate that impostor syndrome, techno-stress, and digital work addiction are positively and significantly correlated with job burnout, whereas AI literacy shows significant negative correlations with the other variables.

According to the findings reported in Table 2, all study variables are significantly correlated with one another at the 0.01 level. Analysis of the correlation coefficients reveals that techno-stress ($r = 0.55$), digital work addiction ($r = 0.51$), and impostor syndrome ($r = 0.48$) have positive and direct relationships with job burnout. This suggests that technology-related pressures and internal doubts regarding personal competence, along with increased dependence on digital tools ($r = 0.52$), contribute to heightened burnout among faculty members.

In contrast, AI literacy exhibits significant negative correlations with all maladaptive variables, including job burnout ($r = -0.37$) and digital work addiction ($r = -0.34$), highlighting the protective role of AI-related knowledge in mitigating psychological and technological stressors. Additionally, the positive correlation between impostor syndrome and techno-stress ($r = 0.41$) suggests that cognitive and emotional challenges increase faculty members' vulnerability when interacting with emerging technologies.

Measurement and Structural Model Fit

The proposed conceptual model was tested using Structural Equation Modeling (SEM) in AMOS. The model fit indices are reported in Table 3.

Table 3. Structural model fit indices

Fit Index	Obtained Value	Recommended Value
χ^2/df	2.31	< 3
GFI	0.92	> 0.90
CFI	0.94	> 0.90
TLI	0.93	> 0.90
RMSEA	0.057	< 0.08

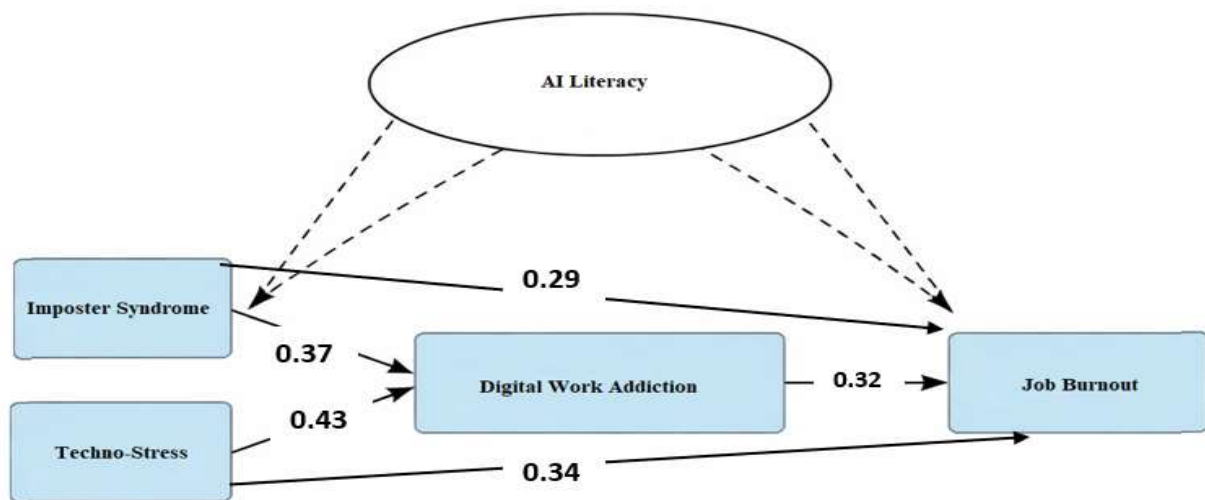
Evaluation of the conceptual model using SEM indicated a good fit between the model and the observed data. As shown in Table 3, the relative chi-square value ($\chi^2/df = 2.31$) falls within the acceptable range (<3), indicating adequate initial model fit. Furthermore, the Goodness-of-Fit Index (GFI = 0.92), Comparative Fit Index (CFI = 0.94), and Tucker–Lewis Index (TLI = 0.93) all exceed the recommended threshold of 0.90. Finally, the Root Mean Square Error of Approximation (RMSEA = 0.057) is below the acceptable cutoff of 0.08, confirming that the structural model demonstrates excellent empirical fit, thereby justifying further interpretation of the causal relationships and path coefficients among the study variables.

Structural Path Coefficients

The standardized path coefficients and significance levels are presented in Table 4.

Table 4. Standardized path coefficients of the structural model

Path	Standardized Coefficient (β)	t-value	Significance
Techno-Stress $\rightarrow$ Job Burnout	0.34	5.82	0.001
Impostor Syndrome $\rightarrow$ Job Burnout	0.29	4.96	0.001
Techno-Stress $\rightarrow$ Digital Work Addiction	0.43	6.71	0.001
Impostor Syndrome $\rightarrow$ Digital Work Addiction	0.37	5.98	0.001
Digital Work Addiction $\rightarrow$ Job Burnout	0.32	5.41	0.001

**Figure 1.** Standardized path coefficients of the structural model

The results indicate that all direct paths in the structural model are statistically significant. As illustrated in the structural model (Figure 1) and detailed in Table 4, techno-stress ($\beta = 0.34$) and imposter syndrome ($\beta = 0.29$) exert positive and direct effects on faculty job burnout. Moreover, the strongest structural relationship was observed between techno-stress and digital work addiction ($\beta = 0.43$), alongside the effect of imposter syndrome ($\beta = 0.37$), underscoring the central role of technological and psychological challenges in fostering compulsive engagement with digital work tools. Finally, the significant path from digital work addiction to job burnout ($\beta = 0.32$) confirms its role as an intervening mechanism that accelerates the depletion of professional energy among university faculty members.

Testing the Mediating Role of Digital Work Addiction

To examine the indirect effects, the bootstrapping resampling method (5,000 samples) was employed.

Table 5. Indirect (mediating) effects

Indirect Path	Indirect Effect	95% Confidence Interval	Result
Techno-Stress → Digital Work Addiction → Job Burnout	0.14	0.08 – 0.21	Significant
Impostor Syndrome → Digital Work Addiction → Job Burnout	0.12	0.06 – 0.19	Significant

Evaluation of the mediating role of digital work addiction using the bootstrapping resampling technique (5,000 samples) confirmed the presence of significant indirect effects of the predictor variables on job burnout at the 95% confidence level. As shown in Table 5, the indirect effect of techno-stress on job burnout through digital work addiction ($\beta = 0.14$) was statistically significant, and since the estimated confidence interval (0.08 to 0.21) does not include zero, the mediating role of digital work addiction was supported.

Similarly, the findings indicate that impostor syndrome exerts a significant indirect effect on faculty job burnout through digital work addiction ($\beta = 0.12$). These results clearly demonstrate that a substantial portion of the impact of technological pressures and psychological self-doubt on the professional exhaustion of faculty members operates through the development of compulsive and excessive engagement with digital work, which ultimately intensifies job burnout.

Testing the Moderating Role of Artificial Intelligence Literacy

To examine the moderating role of artificial intelligence (AI) literacy, a multi-group analysis was conducted in AMOS. Accordingly, the sample was divided into two groups: low AI literacy and high AI literacy.

Table 6. Comparison of structural paths across low and high AI literacy groups

Path	Low AI Literacy	High AI Literacy
Techno-Stress → Digital Work Addiction	0.51	0.29
Impostor Syndrome → Digital Work Addiction	0.44	0.21
Techno-Stress → Job Burnout	0.39	0.22

The results of the multi-group analysis in AMOS revealed significant differences in the strength of relationships between the low and high AI literacy groups. As reported in Table 6, among faculty members with low AI literacy, techno-stress exerted a substantially stronger effect on digital work addiction ($\beta = 0.51$) and job burnout ($\beta = 0.39$). In contrast, these effects were markedly reduced in the high AI literacy group, with coefficients decreasing to 0.29 and 0.22, respectively.

Furthermore, the effect of impostor syndrome on digital work addiction was considerably weaker in the high AI literacy group ($\beta = 0.21$) compared to the low AI literacy group ($\beta = 0.44$). Collectively, these findings provide strong empirical support for the protective and buffering role of AI literacy, suggesting that knowledge and competencies related to artificial intelligence function as a psychological and technological shield that mitigates the detrimental effects of technological pressures and internal psychological challenges on digital addiction and job burnout among university faculty members.

Discussion

The findings of this study demonstrate that combating occupational burnout in the digital era requires more than merely reducing workload. Organizations must proactively enhance faculty members' AI literacy, thereby reinforce their sense of competence and mitigate the risks of imposter syndrome and digital work addiction. This aligns with studies by Tarafdar et al. (2019) and Shekhawat and Kumar (2023), who argue that intelligent technologies—through excessive demands and privacy intrusion—deplete individuals' psychological resources. Specifically, AI

accelerates response expectations and constantly reshapes teaching methodologies, triggering *techno-fatigue*. However, this contradicts Chen's (2021) claim that automated tools reduce stress by lowering workload. The discrepancy likely stems from institutional culture and the mismatch between faculty skills and AI complexity.

Regarding imposter syndrome, the study confirmed its direct and significant effect on burnout—a finding consistent with Bravata et al. (2020). In the AI era, faculty face digital imposter syndrome: despite strong academic credentials, they feel powerless against AI's processing capacity and fear their expertise is obsolete. According to Conservation of Resources (COR) theory, this internal pressure exhausts cognitive resources, culminating in burnout.

Structural modeling in AMOS further confirmed that digital work addiction mediates the relationship between techno-stress and burnout—supporting Quinones's model (2017). Technological pressures push faculty toward compulsive digital tool use (e.g., overworking, forced responsiveness), eroding recovery time and accelerating burnout.

A key innovation of this study is the validation of AI literacy as a moderator: higher AI literacy weakens the harmful effects of techno-stress and imposter syndrome on burnout—consistent with Wang et al. (2024), who identify digital literacy as a psychological buffer. Faculty with high AI literacy employ problem-focused coping strategies, whereas those with low literacy resort to emotion-focused or avoidance strategies, intensifying burnout.

Ultimately, this study presents a comprehensive model showing that AI is not merely a technological shift, but a psychological ecosystem transformation in academia. While technology increases stressors, strengthening AI literacy can serve as a pivotal buffer—preventing environmental stressors from escalating into personal crises (i.e., burnout).

Limitations

This study has several limitations. First, the cross-sectional design precludes causal inferences; longitudinal or experimental designs are needed to confirm directional relationships. Second, data were collected from faculty at Iranian universities, limiting generalizability to other academic contexts or cultures. Third, self-report bias may have influenced responses, despite efforts to ensure anonymity and reduce social desirability. Fourth, while AI literacy was treated as a unidimensional construct, future research could explore its multidimensionality (e.g., ethical, technical, critical dimensions).

Recommendations

To translate findings into practice, the following evidence-based strategies are proposed:

Reverse mentoring: Instead of one-way AI workshops—which may exacerbate techno-stress—universities should implement structured reverse mentoring, pairing younger, AI-literate faculty with senior colleagues. This fosters mutual learning, reduces social comparison (a core driver of imposter syndrome), and builds psychological safety.

Digital boundaries: Formal policies should prohibit non-urgent administrative or student communications outside working hours, safeguarding recovery time and directly curbing digital work addiction.

Sustainable digital promotion criteria: Promotion systems must be reformed to include a *Digital Wellness Index*—rewarding quality, teamwork, and AI-assisted efficiency (e.g., reduced working hours via AI tools) over sheer digital output. This institutionalizes the message that scholarly productivity must not come at the cost of psychological well-being, thereby addressing techno-stress at its structural roots.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Farhangian University.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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