Determinants and Effects of Technostress in Academia: A Systematic Literature Review

Tharindu Dananjaya Weerasinghe
Dr. Pavithra Godamunne
Prof. Asanka Bulathwatta

Abstract: The integration of digital technologies in academia has significantly transformed teaching, research, and administration, offering numerous benefits while introducing the pervasive issue of technostress. This systematic literature review investigates the determinants and effects of technostress within academia, where the unique challenges of digital transformation are particularly pronounced. The study synthesizes insights from 30 peer-reviewed journal articles published in English, between 2007 and 2024, selected from six multidisciplinary databases. A structured protocol guided the review process, incorporating rigorous inclusion and exclusion criteria to ensure relevance and credibility. The findings reveal critical determinants of technostress, including techno-overload, techno-complexity, techno-invasion, and techno-uncertainty, exacerbated by resource constraints, rapid technological advancements, and 'always-on' roles. The adverse effects identified include burnout, reduced productivity, job dissatisfaction, and maladaptive coping behaviors such as cyberloafing, all of which have profound implications for Human Resource Management (HRM) in Universities and higher education institutions. These outcomes highlight the need for HR strategies that address the dual priorities of enhancing technological integration and safeguarding the well-being of academics. Effective HR interventions identified for mitigating technostress, include providing robust institutional support, implementing user-friendly technologies, and digital wellness initiatives. This review highlights the importance of HR driven policies to create sustainable, technology-integrated academic environments, and addresses gaps in theory & literature, mainly the contextual dimensions of technostress in diverse academic institutions. By consolidating extant knowledge, this study offers actionable recommendations for HR practitioners in higher education institutes to foster sustainable, technology-integrated academic environments while preserving the mental well-being of academics.

Key words: Academia, Digital Burnout, Digital Demands, Techno-distress, Techno-fatigue

INTRODUCTION

The accelerating steps of digital transformation has revolutionized various industry sectors, including academia, where university lecturers, researchers, and administrative staff increasingly rely on digital platforms, tools, and communication methods. This technological integration, while offering numerous advantages, also presents unique challenges that can inhibit the ability of academics to perform effectively, and impact workforce dynamics (Atrian & Ghobbeh, 2023; Hessari, Daneshmandi & Nategh, 2023). Among these challenges, technostress has emerged as a critical issue, characterized by the stress experienced when individuals struggle to adapt to new technologies and manage the demands imposed by them. For Human Resource Management (HRM) in academia, technostress represents a significant concern, as it directly influences employee well-being, job satisfaction, and finally, organizational performance. While digital tools are designed to enhance productivity and facilitate collaboration, their rapid evolution and proliferation often lead to anxiety, frustration, and fatigue among users, particularly in academia (Ragu-Nathan et al., 2008; Ayyagari et al., 2011; Alam et al., 2021; Gubernator et al., 2024).

Technostress has been conceptualized as a dual-faceted phenomenon encompassing both positive and negative dimensions (Day et al., 2021; Hessari, Daneshmandi & Nategh, 2023; Gong et al., 2024). On one hand, techno-eustress represents a constructive form of stress that fosters learning, adaptation, and resilience in response to technological demands (Tarafdar et al., 2017). On the other hand, techno-distress refers to the negative outcomes associated with technological challenges, including strain, disengagement, and decreased job performance (Hessari, Daneshmandi & Nategh, 2023). This systematic literature review focuses on the latter; techno-distress, as it is associated with adverse outcomes such as burnout, job dissatisfaction, and, in some cases even deviant behaviors. By examining techno-distress specifically, this review aims to highlight the factors contributing to technostress in academia, and its subsequent effects on the mental health, productivity, and engagement of academics.

Academic environments present a unique context in which technostress manifests. Unlike corporate settings where technology adoption is often accompanied by extensive training and support, universities and other higher education institutions frequently face resource constraints, diverse user needs, and varying levels of technological proficiency among academics (Bailey et al., 2017; Alam et al., 2021). Academics are required to master complex learning

management systems, adapt to new pedagogical technologies, and balance administrative duties with their teaching & research responsibilities. Moreover, the increasing emphasis on digital communication & collaboration often blurs the boundaries between professional and personal life, further intensifying the risk of technostress (Day et al., 2021).

In the extant literature, research on technostress has identified several key determinants that contribute to its prevalence in academic settings, and broadly categorized them into technological, organizational, and individual factors. The rapid pace of technological change, coupled with the complexity and usability issues of new tools, often creates a steep learning curve for academics. Frequent updates, lack of interoperability between platforms, and the overwhelming volume of digital communication are common sources of frustration (Ragu-Nathan et al., 2008). The expectation to quickly adopt and effectively use new technologies without sufficient preparation often leads to feelings of incompetence and technostress (Tarafdar et al., 2017). Moreover, personal attributes, such as technological self-efficacy, adaptability, and coping strategies, play a crucial role in determining the vulnerability to technostress. Academics with low confidence in their technical abilities are more likely to experience anxiety and burnout when faced with technological demands of the twenty-first century (Ayyagari et al., 2011; Ahmed et al., 2020; Perera, 2021; Gohoungodji et al., 2022).

The impact of technostress extends beyond individual well-being, influencing organizational outcomes and the broader academic community. Prolonged exposure to technostress can lead to anxiety, depression, and emotional exhaustion, significantly affecting the mental health of academics. These outcomes are particularly concerning given the high levels of stress already associated with academic roles (Day et al., 2021; Atrian & Ghobbeh, 2023).

Technostress often undermines productivity by impairing cognitive functioning and reducing motivation. Academics struggling with technological demands may experience difficulties in meeting deadlines, conducting research, or delivering high-quality teaching (Tarafdar et al., 2017). The perception of being overwhelmed by technology-related demands often leads to disengagement and a lack of commitment to the institution (Bailey et al., 2017). The stress associated with technology use can strain professional relationships, particularly when colleagues have differing levels of technological proficiency. Miscommunication and

conflicts arising from technological challenges further exacerbate technostress (Ayyagari et al., 2011).

Despite the growing attention on technostress as a significant problem in academia, research on this still remains fragmented. Most studies have focused on specific facets, such as the role of individual coping mechanisms, and the impact of institutional policies, without providing a comprehensive understanding of the determinants and effects of technostress in a focused way. This gap in research has critical implications for Human Resource Management (HRM) in academia, as it limits the ability to design effective strategies to address the negative consequences of technostress on employee well-being, engagement, and performance. A systematic literature review is therefore vital to consolidate the extant knowledge, identify research gaps & future directions, and the development of targeted interventions. Furthermore, such a review can guide the development of targeted HR interventions in academic settings, such as policies to promote digital wellness, training programs to enhance digital competencies, and frameworks for balancing technological demands with employee capacity, ultimately fostering healthier and more resilient academicians.

Research Objectives and Questions

This systematic literature review aims to address the following objectives.

1. To identify and categorize the key determinants of technostress in academic settings.
2. To examine the effects of technostress on the mental health, productivity, engagement, and job satisfaction of academics.
3. To assess existing strategies for mitigating technostress, and provide evidence-based recommendations for HR policy making & institutional practices in higher education.
4. To discover the gaps in extant literature, and outline directions for future research relating to technostress in academia.

To achieve these objectives, four specific research questions (RQs) are raised.

RQ1: What are the key determinants of technostress in academia, and how do those determinants vary across different contexts and situations?

RQ2: What are the critical effects of accumulated technostress among academics?

RQ3: What intervention strategies have been employed to mitigate technostress, and how effective are they from HRM perspectives?

RQ4: What potential research directions can be explored to enhance current knowledge relating to the technostress prevails in academia?

Understanding the specific forms of technostress experienced by academics is crucial for designing effective interventions to alleviate its effect. *RQ1* seeks to identify the major factors contributing to technostress in academia, and examine how these factors vary across different scenarios. *RQ2* focuses on identifying the significant consequences of prolonged technostress, while *RQ3* investigates the strategies most commonly used by academics to manage it. *RQ3* also evaluates the effectiveness of these approaches in mitigating technostress and its associated negative effects, emphasizing actionable recommendations and best practices that can enhance productivity and mental well-being of academics. Moreover, *RQ3* explores institutional factors influencing the prevalence of technostress, such as the availability of supportive policies like technology training and digital well-being initiatives. It examines whether these measures reduce maladaptive behaviors and mitigate their adverse effects, highlighting the critical role of institutional culture in shaping academics' experience. Ultimately, *RQ4* aims to identify future research directions to advance the future studies on technostress.

Significance of the Study

This systematic literature review holds significant value for diverse stakeholders for multiple reasons, including universities and other higher education institutes, academics, policymakers, researchers, technology developers & HR practitioners. For universities and other higher education institutes, the review underscores the pervasive effect of technostress, particularly as digital technologies become integral to teaching, research, and administration. The detrimental effects of technostress highlight the urgent need for effective interventions in academia. Further, for university academics, this review provides a critical understanding of how techno-complexity and frequent technological changes & updates exacerbate technostress. From HRM perspectives, by addressing such challenges, academics can foster a more collaborative & supportive academic environment, improving departmental communication and teamwork. The review also emphasizes the need for academics to engage proactively with development of institutional policies, and advocate for resources that alleviate technostress.

Policymakers and technology developers also stand to benefit from the findings of this review. For policymakers, the review offers actionable insights to design regulations and initiatives that promote

sustainable technology use in academia without compromising mental health and productivity. Meanwhile, technology developers can leverage these insights to design user-friendly tools that minimize stress by reducing techno-complexity and enhancing platform integration. Furthermore, the review highlights directions for future research into long-term effects, cultural variations, and effective interventions for technostress. Researchers can build on these findings to develop globally relevant strategies that address technostress, ultimately fostering a more resilient and productive academic ecosystem.

The rest of this manuscript is prepared to present the following information. In the next section, the study protocols adopted to conduct this systematic literature review, with the inclusion and exclusion criteria are presented. After that it presents the extant background literature on the concept of technostress. Next section discusses the key findings of this literature review in terms of the determinants, effects, and coping mechanisms in academia. Thereafter, summary of the gaps found in extant literature are outlined. The final three sub-sections of this manuscript comprises of the conclusions along with the implications, limitations & directions for future studies.

Study Protocol

This systematic literature review process was carried out in three key phases: database curation, descriptive and interpretative analysis, and reporting. Initially, the keywords, inclusion criteria, and article search databases were determined. A direct search approach was adopted to ensure a structured review, maintaining the quality and credibility of the effort. This phase concluded with the selection of relevant studies for inclusion in the review.

In the second phase, the review focused on identifying the determinants and effects of technostress, existing research gaps, and potential directions for future studies. The database search was conducted in December 2024, using five keywords: *'academia', 'digital burnout', 'digital demands', 'techno-distress', and 'techno-fatigue'*. Searches were performed across Scopus, Web of Science, Directory of Open Access Journals, Emerald Insight, Sri Lanka Journals Online (SLJOL), and ResearchGate using the institutional subscription of University of Kelaniya, Sri Lanka, to find peer-reviewed journal articles published between 2007 and 2024 in English language. These databases were chosen for their multidisciplinary scope and reliability, aligning with prior systematic literature reviews in Human Resource Management (HRM), Information Technology, Computer Science and Industrial Psychology.

The keyword search initially retrieved 113 articles from the databases. Duplicate articles were identified by their Digital Object Identifiers (DOIs), were removed, reducing the dataset to 72 articles. The titles, abstracts, and key conclusions of these articles were reviewed, and 51 articles, focusing the sample on full-time employees were shortlisted. Articles that were not available in full-text or did not include empirical analyses or systematic literature review of technostress were excluded, resulting in a final selection of 30 articles for the current literature review, and reporting. Thematic analysis combined with the content analysis was employed for the final synthesis. Database curation procedure is depicted in figure 01.

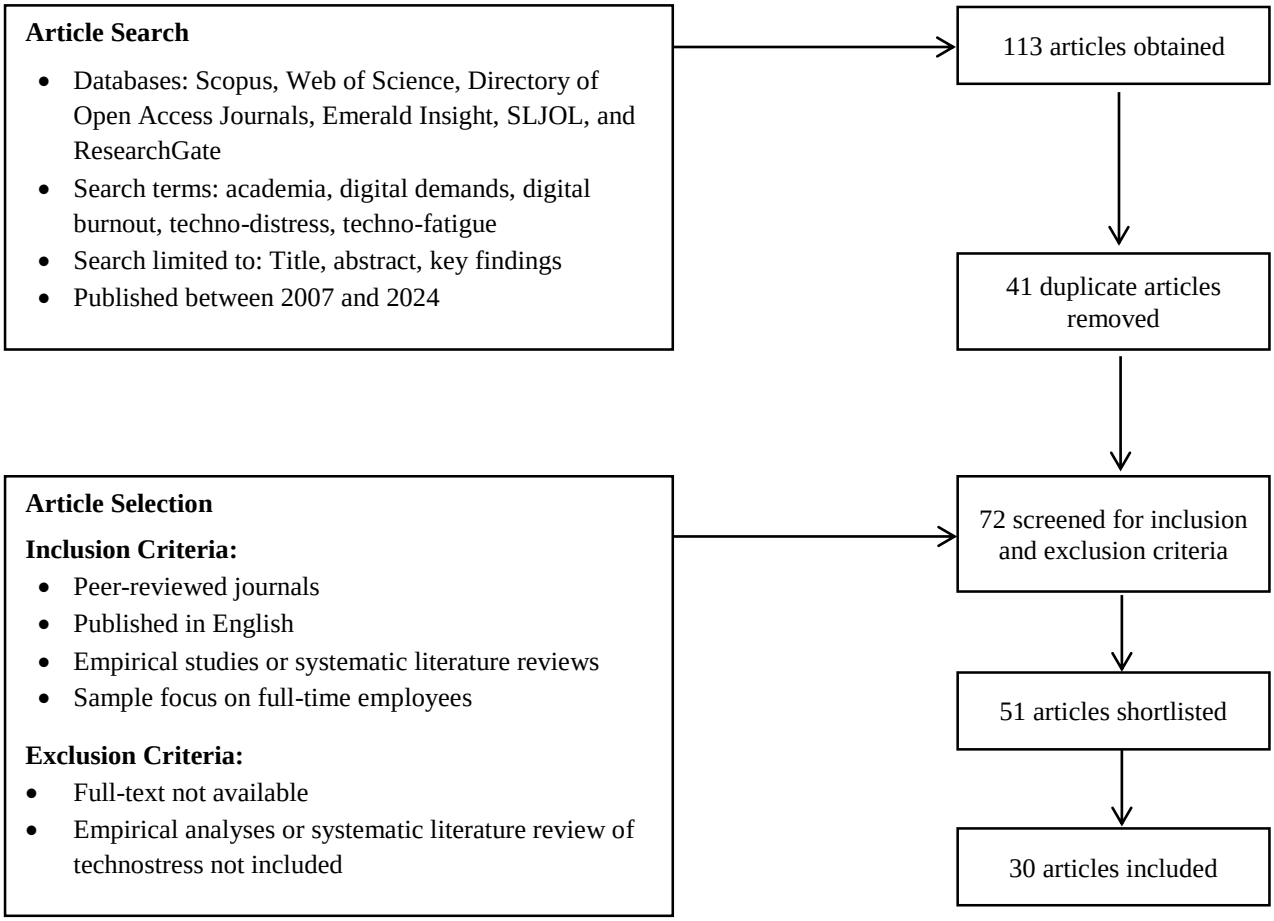

Figure 01: Database curation procedure
Source: Authors, 2026

BACKGROUND LITERATURE

Concept of Technostress

Technostress can be defined as the psychological strain and stress caused by the continual adaptation required by digital technologies (Tarafdar et al., 2011). This stress may result from several factors,

including technology overload, frequent updates and upgrades, multitasking, and the pressure to remain accessible online (Salanova et al., 2013; Ahmed et al., 2020).

Technostress, first introduced by Brod (1984), describes the psychological distress individuals experience from using technology. Although technology has brought efficiencies & new opportunities, it has also introduced stressors like constant adaptation to new tools, an overwhelming digital workload, and the blurring of personal and professional boundaries. In academia, technostress is particularly pronounced, as academics face mounting pressure to adopt digital teaching tools, manage research platforms, and stay connected with colleagues, learning partners, and administrators (Jena, 2015; Atrian & Ghobbeh, 2023).

In academic settings, technostress manifests in various forms. Many faculty members, especially those less familiar with new technologies, feel the pressure to adapt quickly. As a result, they may struggle with frustration, anxiety, or fatigue, which can impact performance and job satisfaction (Ragu-Nathan et al., 2008). Understanding these determinants and effects is essential for academics and institutions to create supportive environments that encourage efficient, stress-minimizing technology use (Zhang et al., 2019; Atrian & Ghobbeh, 2023).

Determinants of Technostress in Academia

Determinants of technostress are multifaceted, often stemming from a combination of individual, institutional, and technological factors. In academic environments, these causes can be particularly pronounced due to the unique demands placed on academics to adapt to rapidly changing digital technologies while maintaining high standards of productivity and professionalism. Technostress is a multidimensional construct that can be analyzed across several dimensions, each representing a different aspect of the digital stress experience. Tarafdar et al. (2007) identified five key dimensions of technostress: '*techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty*'.

Techno Overload

One of the most common determinant of technostress is technology overload, where individuals feel overwhelmed by the sheer volume of digital tools, platforms, and applications they are expected to use (Tarafdar et al., 2007). Academics are often required to navigate Learning Management Systems (LMSs), research databases, online

communication platforms, and various educational software simultaneously. The complexity of these tools can lead to a phenomenon known as techno-complexity, where the sophistication and functionality of technology exceed the capability or tolerance level of the user, resulting in technostress and frustration (Ayyagari et al., 2011; Jena, 2015; Hessari, Daneshmandi & Nategh, 2023).

Technology overload, also known as information overload, occurs when individuals are bombarded with excessive digital information and communication, leading to feelings of being overwhelmed. In academia, technology overload is a prevalent issue due to the reliance on various digital platforms for teaching, research, communication, and administrative duties (Tarafdar et al., 2007). Academics are often required to manage multiple tasks simultaneously, such as responding to emails, conducting virtual meetings, updating online course materials, evaluation & feedback, and data analysis using digital tools. This constant flow of information and tasks can result in cognitive fatigue and decreased performance (Ayyagari et al., 2011).

Digital Communication Overload

As stated by Hessari, Daneshmandi and Nategh (2023), one of the major determinant of technology overload is digital communication. Academics frequently use multiple communication channels, including emails, messaging apps, and virtual learning platforms, to interact with students, colleagues, and administrators. The high volume of messages and notifications can be distracting and disruptive, interrupting focused work time and requiring constant switching between tasks. Research found that excessive digital communication is a significant contributor to technostress, as it demands continuous attention and response, preventing individuals from fully immersing themselves in more cognitively demanding tasks (Tarafdar et al., 2007; Jena, 2015; Zhang et al., 2019; Gohoungodji et al., 2022).

Multiple Digital Platforms

Academics often juggle numerous digital platforms, from virtual learning environments and data analysis software to research databases and project management tools. Each platform has its own interface, functionalities, and learning curve, adding layers of complexity to an already demanding workload. For example, an academic might need to manage lecture content on a Learning Management System (LMS) like Moodle, conduct data analysis using software like SPSS or SmartPLS, and communicate through institutional email, each with unique requirements and tasks. This overload can lead to frustration, as managing several platforms simultaneously requires frequent adaptation and reduces the

ability to concentrate on core academic responsibilities (Ayyagari et al., 2011; Hessari, Daneshmandi & Nategh, 2023).

Frequent Notifications and Alerts

Constant notifications from multiple platforms exacerbate technology overload, contributing to cognitive fatigue. Notifications from emails, virtual classrooms, messaging apps, and academic networks like ResearchGate, Google Scholar or Academia.edu create a persistent state of alertness, as individuals feel compelled to check and respond to each notification promptly. Studies indicate that frequent interruptions from notifications can significantly impair cognitive functioning and lead to decreased focus and productivity (Salanova et al., 2013). For academics, this overload of alerts can disrupt focused activities, such as writing manuscripts or preparing lectures, ultimately affecting the quality and timeliness of work.

Expectation of Immediate Responsiveness

Technology overload is also intensified by the expectation of immediate responsiveness that digital communication fosters. In academic settings, where prompt responses are often expected from academics by learning partners, colleagues, and administration, this expectation can be a source of technostress. Academics may feel pressure to check their emails or messages even outside work hours to meet these demands, leading to extended workdays and a blurred boundary between personal and professional life (Jena, 2015). This constant connectivity further aggravates technostress, as it leaves minimal time for rest and reflection in life.

Techno Complexity

Technology complexity refers to the difficulty of understanding, using, and integrating sophisticated digital tools, which can create additional stress for academics (Weinert et al., 2020). As digital platforms become more advanced, academics are required to master complex functionalities and interface designs, which may not always be intuitive. This complexity can lead to anxiety, frustration, and a reduced sense of efficiency, especially when technology-related tasks detract from primary academic responsibilities (Zhang et al., 2019).

Steep Learning Curves

Many academic digital tools, such as statistical analysis software (e.g., SPSS or R), virtual learning environments (e.g., Blackboard), and online databases (e.g., JSTOR or SLJOL), require significant learning and practice to use effectively. For academics who are not inherently tech-

savvy or are not provided with formal training, the time and effort required to learn these tools can be overwhelming (Ragu-Nathan et al., 2008). Steep learning curves for essential tools can delay productivity, as time spent learning these tools detracts from research, teaching, and other critical academic tasks. Consequently, the stress of mastering complex technologies becomes an additional burden on academics' already full schedules (Zhang et al., 2019; Weinert et al., 2020).

Training and Support

The complexity of technology is often compounded by a lack of sufficient training and support. In universities and other higher education institutions, academics are expected to adopt new digital tools with minimal guidance, leaving them to navigate complex interfaces and functionalities on their own. This lack of training can lead to frustration, mistakes, and a reluctance to use the technology altogether, further contributing to technostress (Califf et al., 2020). Moreover, inadequate technical support can create additional stress when issues arise. Faculty members who encounter technical problems but lack access to timely assistance may spend excessive time troubleshooting, reducing time available for academic work. This lack of support fosters a sense of helplessness and anxiety, as academics feel they cannot rely on institutional resources to resolve their technological challenges (Jena, 2015).

Frequent Updates and Changes

The rapid pace of technological advancement means that digital tools frequently undergo updates, often introducing new features, layouts, and workflows that require re-learning. For academics, these frequent changes can be disruptive, as they need to continually adapt to new functionalities. Studies show that technology-related changes are a significant source of stress, as they require constant adjustment and can lead to a loss of efficiency until the user becomes familiar with the updated system (Tarafdar et al., 2011). Accordingly, in academia, where teaching schedules and research timelines are tightly managed, the need to frequently re-learn updated tools could create considerable stress, and disrupt workflow continuity.

High Expectations for Proficiency

Academics are often expected to be proficient with various digital tools, regardless of their disciplines. This expectation can lead to self-imposed pressure, where academics feel they must achieve a high level of competence with complex software and platforms. The need to demonstrate technological proficiency can cause anxiety, particularly for

academics who struggle to adapt quickly to complex digital environments (Weinert et al., 2020). This pressure is also reflected in the performance expectations within academic institutions, where proficiency with digital tools is increasingly linked to teaching effectiveness and research productivity. Academics who are less proficient with technology may fear that their lack of proficiency will be perceived as a lack of competence, further intensifying technostress. As a result, the complexity of technology, combined with high expectations, creates a stressful environment where academics feel they must constantly improve their technical skills to remain competitive in academia (Tarafdar et al., 2011; Califf et al., 2020).

Techno Invasion

In today's hyper-connected world, academics are often expected to be accessible online at all times, responding promptly to emails, student queries, and administrative requests. This techno-invasion, where work-life boundaries are blurred by constant digital connectivity, can be a significant source of technostress (Ragu-Nathan et al., 2008). Academics, in particular, may find it difficult to disconnect from work-related digital communication, leading to feelings of being constantly *'on call'* and unable to take mental breaks. This *'24/7 connectivity'* fosters an environment in which individuals struggle to balance personal and professional demands, resulting in increased burnout (Salanova et al., 2013). While digital tools facilitate communication and collaboration, the expectation that academics will be available to respond to inquiries outside traditional work hours creates an *'always-on'* culture (Ayyagari et al., 2011; Zhang et al., 2019; Al-Emran et al., 2021).

Student Demands and Expectations

Learning partners today, who are accustomed to instant digital communication, often expect prompt responses from their facilitators in universities. Research shows that learning partners increasingly reach out to academics outside of work hours, whether for academic help, clarification on assignments, course-related questions, and even for mentoring & counselling (Barber & Santuzzi, 2015). When academics do not respond quickly, they may become frustrated or anxious, believing that their needs are being ignored. This pressure to be responsive, even during personal time, is a significant source of technostress, as it disrupts their ability to set even psychological boundaries for their lives (Zhang et al., 2019).

Administrative and Peer Communication

In addition to the demands of learning partners, academics are also expected to stay accessible to their colleagues and administrators.

Digital communication has enabled rapid sharing of information, which is beneficial for collaborative projects & administrative updates. However, when academics are constantly asked to provide immediate feedback on documents, respond to departmental updates, or participate in ongoing discussions, they may feel overwhelmed by the continuous flow of information (Tarafdar et al., 2011). The pressure to provide immediate responses creates additional workload and fosters an *'always available'* expectation that can become exhausting over time (Al-Emran et al., 2021).

Performance Expectations

The expectation for immediate responsiveness is often tied to performance and professional reputation. In academia, where reputation is built on responsiveness, reliability, and dedication, academics may fear that delayed responses will be perceived as unprofessional or lacking commitment. Studies indicate that when employees feel pressured to respond immediately, they may experience heightened technostress due to concerns about meeting institutional performance expectations (Salanova et al., 2013). For academics, this stress is exacerbated by the competitive nature of their field, where career advancement often depends on building and maintaining strong professional networks, and social capital (Al-Emran et al., 2021).

Effects of Constant Connectivity and Immediate Responsiveness on Academics

The most immediate impact of constant connectivity is the loss of work-life balance (Jena, 2015). When academics feel compelled to monitor emails, answer student queries, or respond to administrative requests outside of work hours, personal time becomes filled with work-related activities. This lack of clear boundaries between work and personal life can lead to chronic stress and burnout (Martin & Denny, 2007; Jena, 2015). Over time, the inability to fully disconnect from work-related communication may also impact family relationships & personal well-being. Further, the state of perpetual vigilance can lead to mental fatigue, as academics have limited opportunities to rest and recover from work-related stress. Research shows that constant digital engagement reduces cognitive capacity and heightens the risk of burnout, particularly when individuals feel that they cannot escape work demands even during personal time (Ayyagari et al., 2011; Wang & Li, 2019; Perera, 2021).

Moreover, the expectation for immediate responsiveness can paradoxically reduce overall productivity. Studies indicate that constant interruptions from notifications and the need to respond quickly to

messages disrupt focus and reduce the ability to complete tasks efficiently (Califf et al., 2020). When academics are constantly shifting between communication and task-related work, they may struggle to engage deeply in cognitively demanding activities like lesson planning, data analysis, or academic writing. Similarly, constant connectivity and immediate responsiveness also contribute to anxiety and job dissatisfaction. Over time, this anxiety can erode job satisfaction, as academics perceive their roles as excessively demanding and unsustainable (Weinert et al., 2020). For many academics, job satisfaction is closely linked to autonomy and the ability to manage one's time effectively. However, the *'always-on'* expectation undermines these factors, leaving faculty feeling as though they lack control over their schedules and work-life balance (Perera, 2021; Gohoungodji et al., 2022).

Mitigating Technostress from Constant Connectivity and Immediate Responsiveness

Universities and other higher education institutions develop clear communication policies that outline reasonable response times and discourage after-hours communication. By setting boundaries around expected response time, institutions help academics feel more comfortable disconnecting from work during personal hours. These policies can include recommendations for after-hours messages, encouraging learning partners to send only urgent & high priority inquiries during personal hours (Salanova et al., 2013). Moreover, studies show that digital breaks, where individuals disconnect from screens and digital communications, help improve focus and reduce mental fatigue (Tarafdar et al., 2011). Academic institutions can support this by normalizing the practice of *'unplugging'* during certain times, such as after teaching hours or on weekends, allowing faculty to recharge and return to work with renewed energy.

Flexible work arrangements that allow faculty to set their own schedules and determine when to respond to communications can help mitigate technostress. For instance, academics could be given flexibility in managing their online presence, like in the *'personal meeting room in Zoom'*, allowing them to prioritize deep work over constant responsiveness during certain hours (Barber & Santuzzi, 2015). Institutions also offer training on digital wellness, educating academics on effective strategies for managing connectivity and setting boundaries with digital communication. Digital wellness programs can provide guidance on managing notification settings, using *'do not disturb'*

features, and creating structured schedules for checking and responding to messages (Salanova et al., 2013; Jena, 2015; La Torre et al., 2020).

Techno Uncertainty

Rapid technological advancements and frequent software upgrades contribute to technostress by requiring individuals to continually adapt to new tools and systems. Known as techno-uncertainty, this determinant of technostress reflects the instability and unpredictability associated with constantly evolving digital technologies (Tarafdar et al., 2011). For academics, frequent changes to digital platforms and tools used for teaching, research, and communication necessitate continuous learning and adaptation, which can be both time-consuming and mentally taxing. This constant adaptation is particularly stressful for individuals with limited technological proficiency, as they may feel insecure about their ability to keep up with such demands (Ragu-Nathan et al., 2008; La Torre et al., 2020; Gohoungodji et al., 2022).

In today's digital world, software developers frequently release updates to improve security, introduce new features, and streamline functionality. These updates are often automatic, requiring users to adapt quickly to new interfaces and workflows without warning or adequate training. In academic settings, technological changes impact a range of essential tools, including Learning Management Systems (LMSs), data analysis software, administrative platforms (such as leave application, research grants application, plagiarism detection), and communication applications. While these updates are often intended to enhance usability, they can also disrupt the routines of academics, leading to frustration and anxiety as they attempt to keep pace with continuous changes (Ayyagari et al., 2011; (Dragano & Riedel-Heller, 2020).

Every upgrade or new technological tool requires users to learn its updated features and adjust to any new layout or functionalities. For academics, these frequent learning demands increase cognitive load, as they must regularly re-learn tasks they previously mastered. This frequent re-learning can become frustrating and time-consuming, as each new feature, shortcut, or layout change disrupts established habits and adds to mental strain (Salanova et al., 2013). Studies suggest that repeated exposure to technological changes leads to *'adaptation fatigue',* where individuals feel overwhelmed by the need to constantly adapt (Tarafdar et al., 2011). For academics, this fatigue detracts from the focus required for research, teaching, and other core duties, as time

and energy are redirected toward adapting to new technological demands.

While technological upgrades are intended to improve efficiency, they often have the opposite effect, at least temporarily. Adjusting to new tools or updated features can create inefficiencies, as academics face delays while navigating new layouts or troubleshooting unfamiliar issues. These disruptions can impact productivity, especially when academics are working under tight deadlines. According to Califf et al. (2020), frequent changes in technology reduce productivity by breaking the continuity of work, forcing users to allocate additional time to understanding changes rather than completing essential tasks. For academics who must balance multiple responsibilities, this drop in efficiency can increase stress as they struggle to maintain high-quality outcomes under time constraints. Also, when frequent technological changes disrupt work routines and reduce productivity, they can also lead to frustration, and a decline in job satisfaction. Academics may feel resentful toward such institutional decisions that implement constant upgrades without sufficient input from end-users. This sense of frustration is compounded when academics perceive upgrades as unnecessary or a hindrance to their work rather than an improvement (Salanova et al., 2013; Chen & Karahanna, 2018).

The lack of control over technology use can negatively affect job satisfaction, as academics perceive that their autonomy is limited by frequent, imposed changes (Weinert et al., 2020). Additionally, the time spent adapting to these changes may feel like a waste of time, particularly when academics could otherwise be engaged in meaningful activities like research, mentoring students, or developing new course content (Chen & Karahanna, 2018).

Frequent upgrades can contribute to a sense of technological insecurity, as individuals may doubt their ability to effectively use constantly changing systems. This is particularly relevant for academics who are less comfortable with technology or who work in non-technical disciplines. When updates alter familiar systems, these faculty members may feel anxious about their technological competence, leading to self-doubt and reduced confidence in their skills (Ragu-Nathan et al., 2008). Technological insecurity is especially common among older academics, who may not have the same level of digital proficiency as their younger counterparts. This feeling of insecurity contributes to technostress by fostering an environment where individuals feel they must constantly prove their digital competence (Weinert et al., 2020; Perera, 2021).

Adapting to frequent upgrades demands time, that could otherwise be spent on teaching, research, or personal activities. The opportunity cost of this time investment can be significant, especially for academics juggling heavy workloads (Ragu-Nathan et al., 2008). Instead of focusing on core responsibilities, academics may find themselves allocating hours to learning new features, troubleshooting technical issues, or seeking help from support staff. This misallocation of time not only delays productivity but can also lead to increased stress, as academics fall behind on critical tasks due to the demands of technological adaptation. A study by Ayyagari et al. (2011) concluded that time spent managing frequent technology changes is a significant source of frustration, as it detracts from an individual's sense of accomplishment and fulfillment in their primary work. For academics, who are often passionate about their fields and committed to teaching and research, this diversion of time and energy can be especially demotivating.

Strategies to Mitigate Technostress from Frequent Technological Changes

Universities and other higher education institutions can reduce technostress by offering comprehensive training sessions for every major upgrade or system change. Providing faculty members with tutorials, workshops, and hands-on training allows them to adapt to new tools and features with confidence. Moreover, having access to a responsive IT support team can alleviate frustration by providing immediate assistance for troubleshooting, enabling faculty to resolve technical issues efficiently (Ragu-Nathan et al., 2008). Instead of implementing frequent, abrupt upgrades, institutions could adopt a more gradual approach to introducing technological changes. Studies indicate that a gradual approach helps reduce cognitive load and adaptation fatigue, as individuals have more time to incorporate new technologies into their workflows without overwhelming stress (Tarafdar et al., 2011; Duranova & Ohly, 2015).

Involving academics in decisions related to technological changes can improve the implementation process and reduce resistance. By soliciting feedback from end-users, institutions can better understand the specific needs and preferences of their faculty, allowing for more user-friendly upgrades. This collaborative approach can foster a sense of ownership and reduce feelings of powerlessness, as faculty members feel that their input is valued and considered (Weinert et al., 2020). Further, digital wellness programs can equip academics with strategies to manage technostress effectively. Such programs help academics develop resilience and provide a supportive space for discussing the challenges of

frequent technological changes (Duranova & Ohly, 2015; Califf et al., 2020; Perera, 2021).

Institutions should acknowledge that frequent upgrades may disrupt workflows temporarily and adjust performance expectations accordingly. Academics should be encouraged to take time to learn new technologies without fear of penalty or reduced productivity expectations. Allowing faculty some flexibility in adjusting to updates respects their professional autonomy and acknowledges the cognitive demands of continuous adaptation (Ayyagari et al., 2011).

Work Overload due to Technology

Although digital tools are designed to improve productivity, they can sometimes contribute to techno-overload by increasing workload rather than reducing it. In academic settings, the use of digital platforms often translates to additional administrative tasks, such as uploading course materials, managing online discussions, and handling virtual assessments. These tasks can increase the overall workload for academics, leading to a phenomenon known as role overload (Fuglseth & Sørebø, 2014). Technological advancements have expanded the scope and complexity of work in academia, contributing to increased work expectations and a faster-paced work environment. Digital tools have streamlined the tasks, however have also made it easier to assign new responsibilities, resulting in additional workloads. Faculty members now face greater demands to be productive, accessible, and responsive, leading to a sense of *'catching up'* constantly (Ayyagari et al., 2011).

A study by Ragu-Nathan et al. (2008) found that technology-driven administrative demands significantly contribute to work overload, as faculty members must allocate time to manage these tasks on top of their primary teaching and research duties. Further, academics are expected to be accessible and responsive, often managing multiple channels of communication that require attention throughout the day. The constant influx of messages, notifications, and requests can create a feeling of information overload, as academics try to keep up with high volumes of digital communication (Barber & Santuzzi, 2015). Moreover, Ayyagari et al. (2011) suggested that the accessibility of digital resources has paradoxically increased the expectations on faculty to be constantly productive, as it becomes easier to produce and share research outputs. Consequently, academics may experience a perpetual sense of being *'behind'* on their teaching and research responsibilities.

Technology has created a culture of continuous learning, where academics are expected to stay up-to-date with new teaching methods, software, and digital tools. This expectation for ongoing professional development, while valuable, adds to the workload, as academics must invest time and effort in training, workshops, and self-directed learning. Technological upgrades, new software, and evolving digital tools often require them to develop new skills to stay relevant in their field, which can lead to overload when added to their existing responsibilities (Tarafdar et al., 2011; Perera, 2021).

Techno Insecurity

A lack of adequate training and support can exacerbate technostress, as individuals may feel ill-equipped to handle the demands of digital technology without proper guidance. In academia, budget constraints and limited technical support staff may restrict the amount of training available to faculty members, leaving them to rely on self-directed learning or peer assistance (Jena, 2015). Without sufficient support, academics may experience techno-insecurity, a form of stress associated with feeling inadequate or fearful about technology usage (Ayyagari et al., 2011). This insecurity can reduce self-confidence and lead to avoidance behaviors, further increasing technostress.

Effects of Technostress

When academics feel overwhelmed by digital demands, they may experience chronic stress, which can manifest as emotional exhaustion, a key component of burnout (Tarafdar et al., 2011). Emotional exhaustion not only diminishes motivation but can also lead to disengagement from academic responsibilities. Over time, prolonged technostress can contribute to more severe mental health issues, like depression or anxiety disorders, significantly impacting an academic's ability to function effectively (Salanova et al., 2013).

Technostress often leads to decreased job satisfaction, as academics who feel stressed by digital demands may perceive their work environment negatively. For academics, job dissatisfaction due to technostress can undermine their commitment to the institution, and reduce overall morale (Ragu-Nathan et al., 2008). Research indicate that high levels of technostress are positively correlated with turnover intention, as academics experiencing constant technostress may seek alternative employment opportunities in less digitally demanding environments, though this is a high-tech era (Tarafdar et al., 2017). Additionally, technostress can reduce productivity by causing cognitive overload and reducing individuals' capacity to concentrate. Academics experiencing technostress may struggle to complete tasks efficiently,

leading to errors, delays, and decreased work quality (Fuglseth & Sørebø, 2014). This decline in productivity not only affects individual performance but also impacts institutional effectiveness, as lower-quality teaching, research, and administrative work compromise the academic reputation and performance standards of the institution (Boswell & Olson-Buchanan, 2007).

Technostress can lead to maladaptive coping behaviors, such as cyberloafing or engaging in other types of deviant behaviors as a form of psychological escape (Askew et al., 2014). Cyberloafing, in particular, may become a coping mechanism for academics seeking mental relief from technological demands (Salanova et al., 2013). While cyberloafing provides temporary distraction, excessive engagement in non-work-related internet activities can further reduce productivity and contribute to ethical concerns within academic institutions. In severe cases, technostress may drive individuals to engage in deviant behaviors that violate institutional norms, such as falsifying data, skipping responsibilities, or breaching professional ethics (Akbulut & Eristi, 2018). Technostress can also have physical health effects, as chronic stress is linked to health issues such as headaches, fatigue, and sleep disturbances. For academics, the sedentary nature of digital work combined with high-stress can increase the risk of physical health problems, further diminishing work performance and well-being (Boswell & Olson-Buchanan, 2007; Salanova et al., 2013; Jena, 2015).

Jena (2015) investigated technostress among academics who transitioned to digital teaching platforms, and found that academics experienced high technostress due to the demands of learning new technologies, managing digital communication, and dealing with constant connectivity. In the study sample, academics have reported feeling overwhelmed by the need to constantly adapt to new tools, leading to increased levels of fatigue and job dissatisfaction. The study concluded that institutions need to provide training and support for digital technology use to reduce technostress among faculty members.

Further, Ragu-Nathan et al. (2008) examined the relationship between technostress and job satisfaction among university academics of USA. The findings of the study indicated that technostress negatively impacted job satisfaction, with higher level of technostress associated with lower satisfaction. Academics who experienced high technostress reported feeling less engaged with their work and more likely to consider leaving their positions. The study suggests that reducing technostress is

critical to improving job satisfaction and retention among academics (Boswell & Olson-Buchanan, 2007).

Similarly, Salanova et al. (2013) conducted an empirical study on technostress and its impact on academic performance among university academics in Spain, and concluded that technostress significantly affected academic performance, leading to decreased productivity, lower-quality teaching materials, and impaired student learning outcomes. Academics experiencing high technostress were less likely to meet their teaching and research responsibilities effectively, impacting the institution's academic standards. The study emphasized the need for institutions to address technostress to maintain academic performance and quality.

LITERATURE GAPS & FUTURE RESEARCH

The increasing integration of AI tools & technologies can streamline workflows but may also create anxiety among academics, particularly regarding their ability to adapt, the accuracy of AI systems, and concerns about job security. Research is needed to bride this lacuna understanding how these tools affect technostress and to develop strategies for mitigating. Further, hybrid and remote learning models have become a staple in academia, especially after the COVID-19 pandemic. Future research should explore how academics adapt to these models over the long term and identify support systems to reduce technostress in such settings. Technostress is not a one-size-fits-all phenomenon. Individual differences significantly impact how technostress manifests, and is experienced. Hence, addressing such gaps, future research should focus on identifying individual variations, and the coping mechanisms that build adequate degree of individual resilience.

Thought technostress can vary widely across academic disciplines, investigations into such variations still a lacuna in literature. Also, most existing studies on technostress focus on short-term effects leaving the long-term consequences remain underexplored. Thus, longitudinal research can provide insights into how technostress evolves over time and whether increasing familiarity with technology reduces or exacerbates its effects. Universities and other higher education institutes play a critical role in addressing technostress through policies and interventions. However, little is known in the extant literature about which policies are most effective. The ethical implications of technology use in academia also could identified as an under-explored area. Exploring the intersection of ethics and technostress can shed light on how academic

institutions can create policies that respect individual autonomy while leveraging technology effectively.

The blurred boundaries between personal and professional life due to technology are a major source of technostress in academia. However, a significant gap exists on how technostress impacts different demographic groups, such as men and women, younger versus older, or married versus single. Also, emerging technologies like virtual reality, augmented reality, and blockchain are increasingly being integrated into higher education. Hence, addressing that gap, future research should investigate how to design these technologies to be user-friendly and provide adequate training to minimize stress.

By addressing these gaps, future research can provide a deeper understanding of technostress in academia, its varied manifestations, and strategies to mitigate its impact, fostering healthier and more productive academic eco-system.

CONCLUSION

The findings of this systematic literature review concludes that technostress poses a significant challenge for academics as they manage the intricate demands of digital technologies alongside their professional teaching and research responsibilities. The key determinants of technostress; technology overload, constant connectivity, and techno-complexity, are particularly prevalent in academic environments where digital tools are indispensable. The adverse effects of technostress, including diminished job satisfaction and an increase in deviant behaviors, emphasize the importance of implementing effective strategies to address its root causes and support academic well-being. Additionally, the review reveals that academics often resort to cyberloafing as a coping mechanism for technostress. While this behavior may provide temporary relief, it contributes to a *'cyberloafing-technostress vicious cycle'* that has long-term negative repercussions. Furthermore, excessive technostress can directly lead to deviant behaviors, as academics become increasingly disengaged from their core professional responsibilities. Given these challenges, it is imperative for universities and higher education institutions to recognize the underlying causes and effects of technostress. Such understanding can guide the creation of balanced policies that promote the well-being of academics while ensuring productivity and adherence to ethical standards of the institutes.

This review has effectively achieved its objectives, and provide answers to the research questions raised, by identifying gaps in the

existing research and suggesting future research directions. Future studies should aim to investigate the contextual and cultural dimensions of technostress to provide a more nuanced understanding of the phenomenon. This approach will enable the development of targeted interventions. Overall, the findings of this review offer a solid foundation for advancing technostress research and developing effective policies and practices in academic settings.

Implications

The findings of this literature review have significant implications for multiple parties managing the human resources. Universities and other higher education institutes could use these insights to develop robust initiatives addressing the root causes of technostress which in turn can create an engaged academic environment. Additionally, recognizing the effects of techno-invasion and techno-overload, institutions can establish boundaries to protect personal time of academics that will provide more positive outcomes. Investments in bridging gaps in training, and technical support can further enhance staff digital proficiency, fostering resilience against technological challenges and promoting a sustainable academic culture. In turn, reduced technostress among academics can translate into better teaching quality, research quality, and enhanced academic outcomes for learning partners.

Equipped with these insights, academics also can adopt targeted strategies to mitigate technostress and enhance mental well-being. Moreover, the findings empower academics to advocate for institutional reforms, including more realistic expectations as specified in ‘word-loads and work-norms for university academics’, comprehensive technical support, and policies that integrate well-being measures. By addressing disparities in digital literacy, mandating ongoing technical training, and setting realistic expectations for technology integration, policymakers can create equitable and inclusive educational environments. Further, engaging academics in the technology development process as appropriate, ensures tools are aligned with user needs, promoting acceptance and reducing resistance. Most importantly, building on the findings of this literature review, future researchers can bridge the lacunas in current knowledge while consultants and trainers could develop globally relevant strategies that address technostress, ultimately fostering a more resilient and productive academic ecosystem.

LIMITATIONS AND DIRECTIONS FOR FUTURE

Despite employing established methodologies and protocols for this systematic literature review, several limitations persist. The selection of

search keywords was influenced by subjective decisions based on expert recommendations and commonly accepted definitions of technostress. To address this limitation, future research could explore alternative keywords to broaden the review's scope. Furthermore, the article search was limited to six specific databases which may have resulted in the omission of some pertinent literature. Expanding future studies to include additional databases could help mitigate this limitation. This review also excluded articles from conference proceedings, dissertations, corporate consultancy reports, trainer reports, sample not focused on full-time employees, and studies published in languages other than English. Including these sources in future reviews could help overcome such limitations. Additionally, the search was limited to the title of the article, abstract, and conclusions. Future researchers are encouraged to expand the search to include other sections of manuscripts, such as methodology, analysis & results, implications, and future research directions. Also, the review process may have been affected by subjective bias due to the diverse terms and terminologies used in the screening and shortlisting of articles. Future studies could address this limitation by developing more objective criteria for article selection.

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Ethical Considerations:

The study relies exclusively on publicly available records and does not involve human participants. The research adheres to principles of academic integrity, transparency, and responsible use of official documents.

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Authors:

Tharindu Dananjaya Weerasinghe (dananjaya@kln.ac.lk) is a senior lecturer in the Department of Human Resource Management, Faculty of Commerce and Management Studies at the University of Kelaniya, Sri Lanka. He holds a Bachelor of Science (B.Sc.) honors degree in Human Resource Management with a first-class distinction, and a Master of Business Administration (MBA) with a merit pass, both obtained from the University of Sri Jayewardenepura, Sri Lanka. Currently, he is pursuing doctoral studies at the University of Kelaniya, Sri Lanka. His research interests include Management, Human Resource Management, Buddhist Studies, Psychology & Counselling, and Research Methodology. To date, he has published 12 textbooks. Further, he has published extensively in indexed peer-reviewed journals, and international conferences hosted by the institutes of high repute.

Pavithra Godamunne (pavithrag@kln.ac.lk) is Senior Lecturer in the Department of Medical Education, Faculty of Medicine, University of Kelaniya, Sri Lanka, and has served as Head of the Department and Director of the Staff Development Centre. She holds a BSc (Hons) in Psychology with First Class Honours from the University of East London, an MA in Psychology with First Division from the University of Delhi, a PhD in Psychology and Disability Studies from the University of Kelaniya, and a Postgraduate Certificate in Health Professions Education from the University of Colombo. Her academic and research interests include developmental and clinical psychology, child and adolescent mental health, stress and resilience, health professions education, psychometric tool development, and research methodology. She has published extensively in peer-reviewed journals and book chapters and is actively involved in undergraduate and postgraduate teaching, academic leadership, and faculty development.

Asanka Bulathwatta (asankab@arts.pdn.ac.lk) is a Professor in Psychology at the Department of Psychology, Faculty of Arts, University of Peradeniya, Sri Lanka. He holds a First Class Honours degree in Psychology, a Master's

degree in Work, Organizational, and Personnel Psychology from the University of Valencia, Spain, and a PhD in Psychology from the University of Leipzig, Germany. His research interests include Organizational, Social, Health, and Rehabilitation Psychology, with publications in Q1-ranked journals. He is also the author of translated works in Social Psychology and Stress Management, the latter widely appreciated by the public.