



Artificial Intelligence (AI) Based Workplace Stress Management: A Review of Techniques and Applications

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Abstract

Maintaining a healthy work life balance is crucial for employee productivity and job satisfaction. Workplace stress is a major factor which makes it difficult for the employees as well as the organization to ensure a balance in work life. Factors contributing to workplace stress such as workload, role conflict, poor working conditions, lack of control, job insecurity, lack of recognition and rewards etc. are important to be monitored to mitigate workplace stress. Artificial Intelligence (AI) based techniques and applications can be used for effective monitoring and measurement of stress and can provide customized solutions for its mitigation. The study through content analysis tries to give an overview of the AI based stress management techniques and applications which can be applied systematically to increase productivity and efficiency. The finding reveals that AI has great potential in transforming workplace stress management. By using AI tools and applications, organizations can create sustainable, stress- resilient environment that promote employee wellbeing and productivity.

Key Words: Artificial Intelligence, Workplace Stress, Work Life Balance, Employee Wellbeing.

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1. INTRODUCTION

Workplace stress, a prevalent concern in modern organisations is significantly impacting employee wellbeing and productivity and severally disrupting their work like balance. Mounting pressures on the professional front are causing stress, anxiety, exhaustion, burnout and depression. With the growing and emerging economic situations, workplace stress has become a top priority concern for many organizations with extreme working conditions, job insecurity, and low levels of job satisfaction (Mujtaba, Cavico, & Senathip, 2020). WHO defines stress as a state of worry and mental tension caused by a difficult situation. The American institute of stress defines it as, the body's nonspecific response to any demand whether it is pleasant or unpleasant. Causes of job stress may include workload, role conflict, poor work conditions, lack of control, poor relationships with colleagues and supervisors, job insecurity, lack of recognition or rewards and poor work life balance (Vallasamy, Muhadi, & Kumaran, 2023). Such reasons of workplace stress can cause frustration, restlessness, absenteeism, lack of focus, work avoidance, turnover and reduced employee productivity. In the long run this can lead to serious physiological and psychological issues.

As of August 2024, 31% of adults surveyed worldwide thought stress was the biggest health problem in their country (Statista, 2024). According to the 2024 Gallup state of global workplace report, 86% of the global workforce is either struggling or suffering in terms of mental health and well being. Since work is a top stressor, it is important to look for ways to mitigate workplace stress positively. Organisations should find the workplace stressors and should use effective stress management techniques. The classical methods of stress measurement such as questionnaires and interviews suffers from subjectivity in interpretation, social desirability bias, self reporting limitations, questionnaires design limitations, response rate issues etc. all of which can lead to inaccurate data collection and misinterpretations of employees' stress levels. As artificial intelligence (AI) is revolutionising every area in today's world, AI technology is transforming the ways to maintain workplace wellbeing too. AI based interventions are being developed and used to help employee and organisations to manage workplace stress positively. A study found that using AI-powered stress management tools helped reduce stress and increase overall job satisfaction (Najafabadi, 2021). According to a report by Accenture, companies that effectively use Artificial Intelligence can increase productivity by up to 40%. Moreover a survey by American Management Association found that 62% of companies using AI for productivity management reported significant improvements in work life balance among employees (Linkedin.com). Thus, if artificial intelligence is systematically applied for the detection and intervention of stress related problems at the workplace it can prove to be a boon in managing workplace stress. Therefore using descriptive analysis the study tries to understand the role of artificial intelligence in workplace stress management.

2. LITERATURE REVIEW

Miguel- Angel Garcia-Madurga et al. (2024) the study systematically reviewed the most common applications of AI in improving workplace well being. It revealed that AI is being utilized in areas such as mental health monitoring, emotional support, and personalised wellbeing programs,

identification of psychosocial factors and training & development. The findings suggest that AI has the potential to revolutionize the management of workplace wellbeing.

Bhole, Y. (2024) the paper outlines the systems architecture, data processing techniques and the effectiveness of personalised AI recommendations in stress management, aiming to demonstrate the potential of integrating machine learning algorithms with AI driven interactions for improving mental and physical health outcomes. The findings suggest that the system can provide significant benefits in everyday stress management. The study emphasise on the importance of personalized, real time support in effectively addressing stress.

Madhavi, A. V. R., Rao, B.S. (2023) explored the impact of stress on employee performance and job satisfaction in the workplace. The study delved into the detrimental effects of stress on performance such as reduced productivity, increased errors and absenteeism. The paper also identified factors contributing to work place stress such as high workload, lack of control, poor work life balance and toxic work culture. It emphasized on the significance of recognising and managing stress in the workplace to create a more productive and fulfilling work atmosphere.

Mittal et al. (2022) did a study to find the potential of machine learning to address challenges of stress in workplace and education. The paper emphasizes supervised (predicting stress levels based on physiological signals) and unsupervised (clustering) machine learning algorithms to detect and manage stress across diverse populations. The paper highlights the need for integrating machine learning with IoT devices for seamless data collection and stress prediction.

Jolynn Carr et al. (2011) in their study revealed that the main workplace stressors are perception of job demands, individual differences and social demands. The results of the study emphasized on the need to carefully and regularly monitor stress levels of the employees by the management and frame appropriate policies to manage and mitigate stress and maintain the quality of work life balance.

3. PURPOSE OF THE STUDY

The purpose of the study is to give the overview of Artificial Intelligence (AI) based stress management techniques and applications available for employees (AI powered wearable's, Chatbots, mindful apps etc.) and organizations (AI powered stress monitoring and detection, Chatbots, training and awareness etc.) and their benefits in bringing work efficiency.

4. RESEARCH METHODOLOGY

The paper uses content analysis of the literature available on AI and stress management. Secondary Data was sourced from credible, publicly accessible platforms such as peer reviewed journals, articles, reports and other publications.

5. AI BASED STRESS MANAGEMENT TECHNIQUES AND APPLICATIONS AVAILABLE FOR ORGANIZATIONS

Organizations across various industries have adopted AI-based techniques to manage workplace stress effectively. Here are some notable applications:

5.1 AI-Powered Monitoring and Detection

Wearables and Sensors: Many organizations use AI-enabled wearables, such as Fitbit or Garmin devices, to monitor employees' physiological data (e.g., heart rate, sleep patterns) to detect signs of stress in real time. These devices help in early identification and prevention of stress. (Bhole, 2022) (Miguel-Angel Garcia- Madurga et al., 2024).

Behavioural Analytics: Tools like Microsoft's My Analytics analyse email patterns, meeting hours, and work intensity to identify overworked employees and suggest adjustments to prevent burnout.

5.2 Personalized Stress Management

Chatbots and Virtual Assistants: AI-powered mental health Chabot's, such as Woebot and Wysa, provide employees with 24/7 access to counselling and stress management support. These tools use natural language processing (NLP) to simulate human-like conversations and offer cognitive behavioural therapy (CBT) based solutions (Bhole, 2022).

Customized Recommendations: AI systems analyse employee data to recommend personalized stress-relief activities, such as breaks, mindfulness exercises, or fitness regimens tailored to individual needs.

5.3 Predictive Analytics for Stress Prevention

Workload Analysis: AI tools like Sapience and Humanyze analyse work patterns to identify high-stress periods. Managers can use these insights to redistribute workloads, adjust deadlines, and implement preventive measures.

Attrition and Burnout Prediction: AI models help HR departments predict employee attrition or burnout risks, enabling proactive interventions like role changes or offering additional support (Miguel-Angel et al., 2024).

5.4 AI-Enhanced Wellness Programs

Gamification: Platforms like personify health (virgin pulse) incorporate AI to gamify stress management, encouraging employees to participate in wellness challenges and track their progress.

Virtual Reality (VR) Stress Relief: Organizations use AI-driven VR experiences, such as guided meditation or calming virtual environments, to reduce employee stress levels during breaks.

5.5 Sentiment Analysis

AI-driven sentiment analysis tools assess employee feedback from surveys, internal communication platforms, or social media to gauge organizational stress levels. This helps organizations implement targeted interventions.

5.6 Training and Awareness

Some companies use AI to design personalized stress management training modules, helping employees build resilience and cope better with workplace demands (Bhole, 2022).

By integrating these AI-based techniques, organizations can create a more supportive work environment, enhancing productivity and employee well-being.

6. AI BASED STRESS MANAGEMENT TECHNIQUES AND APPLICATIONS AVAILABLE FOR EMPLOYEES

Employees can leverage AI-based tools and techniques for stress management to improve their mental well-being and maintain productivity. Here are some widely used approaches:

6.1 AI-Powered Wearables

Smartwatches and Fitness Trackers: Devices like Fitbit, Apple Watch, and Garmin use AI to monitor physiological signals such as heart rate, sleep patterns, and physical activity, helping employees identify stress triggers and take corrective actions.

Biofeedback Devices: Wearables like Muse and Heart Math provide real-time feedback on stress levels and suggest relaxation techniques, such as deep breathing or meditation (Bhole, 2022)(Miguel-Angel et al.,2024).

6.2 Mental Health Chatbots

Virtual Therapists: Tools like Woebot and Wysa offer employees on-demand access to AI-driven mental health support, providing techniques like cognitive behavioural therapy (CBT) and mindfulness exercises through chat-based interactions(Bhole,2022).

Daily Check-ins: Apps like Sanvello and Headspace Care (Ginger) use AI to track mood and offer stress-relief activities tailored to individual needs.

6.3 AI-Powered Mindfulness Apps

Meditation and Relaxation Tools: Apps like Calm and Headspace use AI to recommend personalized meditation sessions based on user preferences and stress patterns.

Real-Time Stress Relief: AI in apps such as Breathwrk provides guided breathing exercises designed to lower stress and anxiety instantly.

6.4 AI for Workload Management

Task Prioritization Tools: AI platforms like Todoist and Trello use machine learning to help employees organize and prioritize tasks, reducing stress caused by overwhelming workloads.

Time Management Apps: Tools like Rescue Time analyse work habits and suggest ways to improve productivity while avoiding burnout.

6.5 AI-Driven Sentiment Tracking

Mood Journaling Apps: AI-enabled apps like Reflectly analyse employees' written entries to track emotional trends and suggest coping mechanisms over time.

Sentiment Analysis in Communication Tools: Integrated AI features in Slack or Microsoft Teams help employees understand emotional tones in conversations and adjust communication to reduce misunderstandings and stress.

6.6 Gamified Stress Management

Apps like Happify use AI to gamify stress management, engaging users with activities and games designed to improve emotional well-being.

6.7 AI-Powered Virtual Reality (VR) Tools

Immersive Stress Relief: VR platforms like TRIPP offer guided meditation and calming virtual environments that help employees relax and disconnect from workplace stress.

These AI-based techniques empower employees to take control of their mental well-being, offering accessible, personalized, and real-time solutions to stress.

7. CONCLUSION

Artificial Intelligence is being used in every area today be it business, science, health, education. Everyone is using AI based techniques to make work easier and bring efficiency. To contend with the up surging competition, ever-changing business environment, mounting work pressures, maintaining a good work life balance is important as it can help employees feel more refreshed, productive and reduce stress. Artificial intelligence (AI) is revolutionizing workplace stress management by offering innovative, efficient, and scalable solutions. This paper highlights how AI-based techniques, such as wearable technologies, personalized interventions, gamification and virtual reality, workload management etc. are being utilized to monitor, prevent, and address workplace stress. These advancements enable real-time detection, tailored recommendations, and proactive interventions, empowering both employers and employees to create healthier work environments. However, the implementation of AI in workplace stress management also presents challenges. Ethical concerns, such as data privacy, algorithmic transparency, and the risk of over-reliance on AI, need to be addressed to foster trust and acceptance. Additionally, more research is required to enhance the accuracy and inclusivity of AI models, ensuring they are effective across diverse organizational contexts and individual needs. In conclusion, AI holds significant potential to transform workplace stress management. By using AI tools and applications organizations can create sustainable, stress-resilient ecosystems that promote employee well-being and productivity.

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