ISRG Journal of Arts, Humanities and Social Sciences (ISRGJAHSS)

ISRG PUBLISHERS
Abbreviated Key Title: ISRG J Arts Humanit Soc Sci
ISSN: 2583-7672 (Online)
Journal homepage: https://isrgpublishers.com/isrgjahss
Volume – IV Issue -I (January- February) 2026
Frequency: Bimonthly

Mental Fatigue of Knowledge Workers: Hazards, Manifestations, Theoretical Models and Intervention Strategies

Hou Yongmei

Department of Psychology, School of Humanities and Management, Guangdong Medical University, Dongguan, Guangdong, 523808, China

| **Received:** 29.03.2025 | **Accepted:** 02.04.2025 | **Published:** 12.01.2026

*__Corresponding author:__ Hou Yongmei

Department of Psychology, School of Humanities and Management, Guangdong Medical University, Dongguan, Guangdong, 523808, China

Abstract

Background: *Mental fatigue is a common occupational psychological issue among knowledge workers, which can easily lead to various psychological disorders and major accidents. However, the etiology and pathogenesis remain unclear.*

Objective: This article aims to review the research progress on mental fatigue among knowledge workers, focusing on understanding the hazards, manifestations, theoretical models, and intervention strategies.

Methods: *A thorough search was conducted on PubMed, Web of Science, EBSCOhost (CENTRAL, SPORTDicus), and CNKI using the keywords "knowledge workers + mental fatigue" or "intellectual workers + mental fatigue", as well as on Google Scholar and reference sources for grey literature.*

Results: *A total of 50 papers were included. Previous literature indicates that mental fatigue among knowledge workers occurs on the basis of long-term, singular high-intensity work tasks causing physical fatigue, manifesting as feelings of psychological exhaustion and boredom, involving multiple aspects of cognition, emotion, and function. There are various theoretical models of mental fatigue, with the widely cited cognitive resource theory, self-regulation theory, underload theory, and motivation control theory. Each theoretical model focuses on a specific aspect and fails to reveal the complete psychological mechanism of mental fatigue. Interventions include mindfulness training, music relaxation, physical activity, and appropriate rest.*

Conclusion: *Mental fatigue poses a significant threat to knowledge workers, but its psychological mechanism remains unclear. Although there are various intervention methods, they have failed to completely eliminate mental fatigue.*

Keywords: Knowledge workers; Mental fatigue; Theoretical model; Intervention

DOI: 10.5281/zenodo.18218226

1. Introduction

Knowledge workers [1] refer to employees who possess extensive professional knowledge, high professional skills, and strong learning and innovation abilities. They tend to be independent-minded, pursue autonomous work, and aspire to realize their own value. From the perspective of professional proficiency, knowledge workers can be divided into four categories: professional technical management, general management, professional technical, and general technical [1].

The advantages of knowledge workers include their high educational level, strong learning ability, rich professional knowledge, strong innovation ability, independent consciousness, and personal value consciousness. However, the work they engage in is often non-repetitive, difficult to quantify, difficult to replace, creative, and personalized. The disadvantage is that for enterprises, due to their strong independence, there are issues of "difficulty in use" and "difficulty in retention"; for individuals, due to the difficulty of the work and high career expectations, they experience greater psychological stress [2].

Mental fatigue is a state of exhaustion and boredom that arises when individuals encounter corresponding environments, regardless of whether they are subjected to a large amount of work, based on the physical fatigue caused by long-term, monotonous, and high-intensity work tasks. It manifests as psychological resistance and abnormal stress responses in the central nervous system [3]. Mental fatigue can reduce an individual's ability to inhibit responses, process information, and focus attention, leading to more occupational errors [3]. At the same time, due to decreased ability to regulate actions, low mood, and reduced work efficiency, individuals experiencing mental fatigue are more prone to various psychological disorders and major accidents, posing threats to the safety of individuals, businesses, and society at large [4-5].

Early research focused on the impact of workload on individuals [6]. Studies have found that as working hours increase, individuals will experience the accumulation of fatigue, which has a negative impact on subsequent work. Over the past 20 years, with the development of psychology and cognitive science, research on mental fatigue has gradually shifted towards its psychological mechanisms. Researchers have proposed that individuals not only consume energy when performing tasks, but also consume limited self-control resources and cognitive resources. At the same time, researchers have begun to pay attention to the dynamic changes in the relationship between motivation and attention under mental fatigue, believing that mental fatigue is closely related to the motivation intensity of individuals towards specific tasks and the adjustment process of their attention allocation. For example, Hopstaken [7] et al. pointed out that under mental fatigue, individuals will experience decreased motivation and distracted attention towards tasks.

With the advancement of industrial automation and social development, the nature of most work has gradually shifted from traditional manual labor to knowledge-based labor. In various fields such as manufacturing, transportation, healthcare, and military training, mental fatigue among knowledge workers has become increasingly common, with an incidence rate reaching 60.3% to 63.7% [8-12]. In terms of work environment, male employees are more prone to mental fatigue than female employees, shift workers are more prone to mental fatigue than those with two-day weekends, employees in clerical and technical positions are more prone to mental fatigue than those in management and professional technical positions, and grassroots employees are more prone to mental fatigue than middle-level and senior employees. In summary, the reason is that the work environment on the front line of production and construction is relatively poor [13]. Mental fatigue may lead to a decrease in work efficiency and an increase in the incidence of errors. In high-risk environments, it may even trigger accidents or catastrophic events [4-5]. Although not all human errors can be attributed to mental fatigue, preventing this phenomenon is undoubtedly an urgent practical issue that needs to be addressed in all industries. Therefore, accurately identifying the core characteristics of mental fatigue, deeply exploring its formation mechanism, and developing effective intervention strategies based on this have profound practical value and theoretical significance for optimizing the work performance of knowledge workers and promoting their mental health.

2. Manifestations of mental fatigue

2.1 Cognitive dimension

In a state of mental fatigue, an individual's cognitive resources are depleted to a lower level, which significantly interferes with the decision-making process [14]. Mental fatigue can reduce an individual's executive function. When dealing with risky choices that require more cognitive effort for thinking and weighing, individuals experiencing mental fatigue tend to choose conservative options more often [15]. Additionally, mental fatigue has a significant impact on an individual's attention allocation and maintenance. The allocation of attention resources is a crucial aspect of the cognitive process, determining an individual's screening and processing of information. When dealing with novel things in a state of mental fatigue, individuals' ability to allocate attention resources decreases [14], leading to a reduction in the efficiency of processing new information. A study using eye-tracking equipment found that individuals in a state of mental fatigue have a reduced willingness to observe the environment and a narrowed attention span [16], which may interfere with their decision-making process in complex tasks.

2.2 Emotional dimension

Individuals' emotional regulation ability significantly decreases under mental fatigue [17]. Even though they can maintain normal emotional responses, their experience of negative emotions intensifies [18-19]. This may be due to the decline in regulation ability, making individuals more vulnerable to stress, prone to feelings of inferiority and self-doubt, and even inducing psychological disorders such as anxiety and depression [19].

2.3 Functional dimension

Mental fatigue significantly impairs bodily functions. Individuals experiencing mental fatigue exhibit notable declines in performance in tasks such as hand-eye coordination, reaction speed, and endurance [20-22]. This phenomenon is also manifested in meticulous cognitive tasks like imagination [20]. Furthermore, this decline in control ability is persistent, and its impact may persist for some time even after the task is completed [23].

3. Relevant theories of mental fatigue

3.1 Cognitive resource theory

The core assumption of this theory is that the psychological resources that individuals can mobilize when performing cognitive tasks are limited [18]. This theory provides an analytical framework for understanding the relationship between mental

DOI: 10.5281/zenodo.18218226

fatigue and cognitive resources. However, there are three views in academia regarding the relationship between cognitive resource depletion and mental fatigue. The first view holds that cognitive resource depletion is the main factor triggering individual fatigue experiences. When faced with multitasking, high-stress environments, or prolonged cognitive tasks, individuals' cognitive resources gradually become depleted, leading to a decline in cognitive functions such as attention maintenance, memory, and decision-making [24]. The second view emphasizes that mental fatigue is related to the effort made in allocating cognitive resources. Individuals often adopt multitasking strategies to cope with work stress, which requires them to dynamically adjust the allocation of cognitive resources between different tasks [25], and the resource allocation process itself requires additional psychological effort. This view argues that mental fatigue is not merely a result of resource depletion, but rather the cumulative effect of the psychological effort individuals invest in the resource allocation process [26]. The third view suggests that mental fatigue may be a strategic behavior adopted by individuals to protect their limited cognitive resources. Mental fatigue can prompt individuals to reduce further consumption of cognitive resources, thereby protecting them from the negative effects of cognitive overload [7]. This view emphasizes the adaptive function of mental fatigue, which prevents excessive consumption of cognitive resources by reducing engagement in tasks.

3.2 Self-regulation theory

Self-regulation refers to an individual's ability to autonomously manage and control their own behavior, emotions, and cognitive processes. It is a core component of executive function [27]. The composition of self-regulation involves multiple levels, including the setting of behavioral standards, continuous monitoring of behavior, the application of self-control strength, and the stimulation and maintenance of motivation [27]. This ability is crucial for individuals to achieve task goals and maintain mental health. In psychological research, self-control is widely recognized as a limited psychological resource, which availability may decrease under continuous cognitive load, leading to the so-called "ego depletion" phenomenon [27]. In a state of ego depletion, an individual's self-control resources are difficult to quickly recover, resulting in a higher risk of failure in subsequent self-control attempts [27]. Other researchers believe that mental fatigue is a cognitive and emotional state experienced by individuals after continuously performing self-control tasks. This state not only reflects the impact of previous tasks but may also be a mediating variable affecting an individual's performance in subsequent tasks [28]. When individuals are in a state of mental fatigue, they perform worse on tasks requiring self-control, which may be because mental fatigue weakens the cognitive resources and motivation levels required for individuals to maintain self-control [28].

3.3 Under-load Theory

The Under-load Theory posits that when individuals face tasks that are less challenging than their cognitive abilities, the lack of sufficient challenge leads to a decrease in endogenous rewards, requiring them to invest more cognitive resources to maintain attention and suppress distracting tendencies. The Time-On-Operating (TOO) procedure can be used to simulate and explore the potential impact of prolonged simple work on individuals' psychological and physiological states. In such procedures, participants are typically required to complete a series of monotonous and highly repetitive tasks. Through methods such as measuring using the NASA-TLX (Task Load Index) scale, participants' subjective reports, and eye-tracking technology, researchers have observed signs of mental fatigue in subjects after completing tasks [28]. These signs include but are not limited to decreased attention, the emergence of negative emotions, and a decline in work performance. Furthermore, some studies have explored the impact of repetitive tasks on individuals' emotional states from an emotional perspective. These studies indicate that individuals may experience an emotional void and meaninglessness when performing tasks with low stimulus levels, leading to boredom [29]. This emotional experience further exacerbates mental fatigue, thereby affecting their overall work performance and mental health.

3.4 Motivation Control Theory

Motivation Control Theory emphasizes the trade-off between task costs and expected rewards, and uses this framework to explain the emergence of mental fatigue. According to this theory, mental fatigue can be regarded as an adaptive state that maintains effective management of overall goals [30]. The subjective experience of mental fatigue arises from conflicts between current goals and competing goals or action tendencies. That is, when individuals perceive that the costs of a task (such as time, energy, or psychological resource investment) exceed the rewards obtained or punishments avoided by completing the task, mental fatigue emerges as a signal, prompting individuals to adjust their behavior to slow down or suspend task execution [30]. In studies on the relationship between motivation intensity and task performance, researchers have found that individuals with higher motivation levels exhibit relatively stable performance levels and less fatigue when facing tasks, while individuals with lower motivation levels experience decreased performance and fatigue. It can be seen that motivation intensity plays a key role in maintaining task execution and preventing mental fatigue.

4. Intervention methods for mental fatigue

The manipulations of autonomous self-control exertion, person-fit, nature exposure, mindfulness, and transactional direct current stimulation showed that positive interventions counteract MF and improve sport-specific performance in different domains, including strength, speed, skill, stamina, and perceptual-cognitive skills. The selected interventions could significantly counteract MF and improve subsequent sport-specific performance. Moreover, self-regulation and attention resources showed the importance of the potential mechanisms behind the relevant interventions [31].

4.1 Mindfulness training

Through mindfulness training, individuals can significantly reduce stress levels, anxiety, and psychological discomfort, thereby promoting overall physical and mental health and improving sleep quality [32]. In addition, individuals who have undergone mindfulness training exhibit better problem-solving and psychological recovery abilities when facing cognitive tasks and exercise challenges [33], indicating that mindfulness training has a positive effect on alleviating mental fatigue [34]. Research in the field of cognitive psychology reveals the mechanism of action of mindfulness training, which is to help individuals with limited cognitive resources cope with task demands more efficiently by optimizing the allocation of cognitive resources [26]. From the perspective of self-control, the process of mindfulness training can reduce automatic reasoning, meaning that individuals will not

DOI: 10.5281/zenodo.18218226

immediately react when faced with information, but will be able to observe and evaluate the situation more objectively. This de-automated response helps reduce psychological effort and alleviate mental fatigue [35]. Some scholars also believe that by improving individuals' insight into their own thoughts and emotions, mindfulness training enables them to be aware of their psychological state and adopt appropriate coping strategies [36]. This self-awareness allows individuals to better manage their emotions and alleviate mental fatigue when faced with stress. It has also been noted that the effectiveness of mindfulness training is influenced by individual training experience. Individuals who lack mindfulness training experience or have insufficient training time may not achieve significant results in alleviating mental fatigue [37]. That is to say, in order to achieve the effect of alleviating mental fatigue, individuals need a certain degree of practice and time investment to cultivate and consolidate mindfulness skills.

4.2 Music relaxation

Music, as a cross-cultural art form, has been proven to have a significant positive impact on an individual's emotional state, which in turn may lead to positive effects on cognition and motor performance [38]. Studies have shown that listening to music can stimulate the brain to secrete more dopamine, a neurotransmitter associated with reward, pleasure, and motivation, which is closely related to the enhancement of positive emotions and the reduction of perceptual consumption [39]. Under the condition of performing cognitive tasks, listening to relaxing music chosen by the individual can effectively alleviate the mental fatigue induced by task execution [23]. This phenomenon has been further confirmed in event-related potential (ERP) research. The P3 amplitude in ERP signals, an important indicator for evaluating cognitive function and attention state, decreases less in the music intervention group compared to the control group, indicating that music helps maintain cognitive control processes and assists individuals in maintaining a higher performance level during cognitive tasks [40]. Music also has a good mood-regulating effect. Through psychological mechanisms such as evaluative conditioning, visual imagery, and episodic memory, music can significantly affect an individual's emotional response [41]. Neuroscience research further reveals that music can activate brain regions related to emotional processing, such as the amygdala, nucleus accumbens, and hippocampus [42]. By activating these brain regions, music can regulate emotional states and alleviate fatigue caused by emotional fluctuations.

The types of music interventions that counteract mental fatigue include relaxing, exciting, and personal preference music, all of which were associated with decreased subjective feelings of mental fatigue and changes in objective physiological markers. Cognitive performance, particularly in inhibition and working memory tasks impaired by mental fatigue, was countered by both relaxing and exciting music. Exciting music was found to decrease reaction time more effectively than relaxing music in working memory tasks. The physiological marker of steady-state visually evoked potential-based brain-computer interface (SSVEP-BCI) amplitude increased, confirming that exciting music counteracts mental fatigue more effectively than relaxing music. Behavioral performance in tasks such as arm-pointing, the Yo-Yo intermittent test, and the 5 km time-trial, which were impaired by mental fatigue, were counteracted by personal preference music. Relaxing music, exciting music, and personal preference music effectively counteract mental fatigue by reducing feelings of fatigue and mitigating performance decrements. Individuals engaged in mentally demanding tasks can effectively counteract concurrent or subsequent cognitive performance decrements by simultaneously listening to relaxing or exciting music without lyrics or by using music during recovery from mental fatigue. Exciting music is more effective than relaxing music in counteracting mental fatigue. Personal preference music is effective in counteracting behavioral performance decrements in motor control and endurance tasks. Mentally fatigued individuals could apply personal preference music to counteract subsequent motor control performance decrements or simultaneously listen to it to counteract endurance performance decrements [43].

4.3 Physical activity

There were two conditions. In the experimental condition, the participants first performed an arm-pointing task, then carried out a 32-min cognitively demanding task to induce mental fatigue (TLDB task), followed by another arm-pointing task at the end of the experiment. Between the end of the cognitively demanding task and the last arm-pointing task, 20 min went during which participants performed either 15 min of physical activity, of listening to music or of discussion (control). The subjective feeling of mental fatigue was assessed before each arm-pointing task and after the cognitively demanding task. For "physical activity" and "listening to music" groups, EEG was recorded at rest after each evaluation of subjective feeling of mental fatigue and during the cognitively demanding task. An increase in alpha power during the cognitively demanding task evidenced the presence of mental fatigue, without recovery during the following 20-min period. In the control condition, the arm-pointing task performance was deteriorated 20-min after the cognitively demanding task, while it remained stable after both physical activity and listening to music. Furthermore, recovery on the subjective feeling of mental fatigue was similar for both groups. The present results suggested that practicing physical activity and listening to music could be efficient strategies to counteract the negative effects of mental fatigue on motor performances [44].

4.4 Appropriate rest

Rest is not only a process of physiological function recovery but also a crucial mechanism for the reconstruction of psychological and cognitive resources. After undergoing prolonged tasks requiring focused attention, knowledge workers need to recover their cognitive resources through rest, and this recovery process often takes longer than the task itself [45]. Arranging appropriate breaks during continuous cognitive or operational tasks can interrupt the accumulation of mental fatigue [46]. Neuroscience research further reveals changes in brain activity during rest, especially in key brain regions such as the prefrontal and parietal lobes, which maintain attention control and executive function. Rest provides these brain regions with opportunities to restore dynamic functional connectivity, thereby enhancing the overall efficiency and information processing capabilities of the brain network [47]. The way of rest also has a certain impact on the recovery of mental fatigue. Studies indicate that engaging in self-selected and enjoyable activities during rest can not only provide psychological satisfaction but also enhance individuals' intrinsic motivation and promote the establishment of new resources [48]. In addition, adopting some intervention strategies during rest, such as taking a 15-30 minute nap, practicing systematic breathing, or engaging in mental imagery, can help individuals recover from subjective feelings of mental fatigue more quickly [49]. The duration of rest is also crucial for the recovery of cognitive abilities. Studies show that only through adequate rest can

DOI: 10.5281/zenodo.18218226

knowledge workers return to their optimal state in subsequent cognitive tasks or physical activities [50].

5. Conclusion

In recent years, the academic community has increasingly recognized the detrimental effects of mental fatigue among knowledge workers and the importance of mitigating it. However, previous research on the causes, influencing factors, and intervention strategies of mental fatigue remains relatively scarce. Simultaneously, as neural mechanisms constitute the biological foundation of mental fatigue, research in this area has been significantly propelled by the rapid advancements in neuroscience, making it a research hotspot over the past decade. Researchers tend to explore the mechanisms of mental fatigue from a neurobiological perspective, with relatively less in-depth exploration from an individual psychological perspective. Research from a psychological perspective not only aids in unveiling the psychological causes of mental fatigue but also provides more direct theoretical support for daily psychological interventions among knowledge workers. In future research, it is imperative to delve into the multidimensional influencing factors of mental fatigue, encompassing psychological and sociological elements such as work stress, work environment, and individual differences (particularly physical and personality differences), to construct a more comprehensive and specific theoretical model and develop diverse intervention methods to assist knowledge workers across various industries in establishing mechanisms for preventing and managing mental fatigue.

References

1. Pekala, N. Holding On To Top Talent [J]. Journal of Property Management, 2001, 66(Sep/Oct):1-8.
2. Dong JH, Gao Y. Research on the Influence Mechanism of Knowledge Workers' Job Engagement: From the Perspective of Organizational Justice [J]. Technology Journal of Operational Research and Management, 2019, 271(2): 67-71.
3. Sun H, Soh KG, Roslan S, et al. Does mental fatigue affect skilled performance in athletes? A systematic review [J]. PLoS One, 2021, 16(10): e0258307.
4. Wang ZD, Chang YL, Schmeichel BJ, et al. The effects of mental fatigue on effort allocation: Modeling and estimation [J]. Psychol Rev, 2022, 129(6): 1457-1485.
5. Batista MM, Paludo AC, DA SMP, et al. Effect of mental fatigue on performance, perceptual and physiological responses in orienteering athletes [J]. J Sport Med Phys Fit, 2021, 61(5): 673-679.
6. Griffith JW, Kerr W A, Mayo TB, et al. Changes in subjective fatigue and readiness for work during the eight-hour shift [J]. Journal of Applied Psychology, 1950, 34(3): 163-166.
7. Hopstaken JF, Van Der Linden D, Bakker AB, et al. Shifts in attention during mental fatigue: Evidence from subjective, behavioral, physiological, and eye-tracking data. [J]. Journal of Experimental Psychology: Human Perception and Performance, 2016, 42(6): 878-889.
8. Jang HJ, Kim O, Kim S, et al. Factors affecting physical and mental fatigue among female hospital nurses: The Korea nurses'health study [J]. Healthcare, 2021, 9(2): 201.
9. Van Cutsem J, Marcora S, De Pauw K, et al. The effects of mental fatigue on physical performance: A systematic review [J]. Sports Medicine, 2017, 47(8): 1569-1588.
10. Parenteau M, Chen C (Julian), Luna-García B, et al. Fatigue in NTSB investigations 2013-2019: Evidence of accidents and injuries [J]. International Journal of Occupational Safety and Ergonomics, 2023, 29(2): 717-722.
11. Jia AF, Tian SC, Guo XY, et al. Experimental study on mental fatigue of miners [J]. Journal of Safety and Environment, 2021, 21(6): 2608-2616
12. Tian YQ, Chen XX, Cai Y, et al. The relationship between operational fatigue state and psychological stress, stress perception, and self-efficacy in soldiers from a certain unit of the Second Artillery Corps during high-altitude training [J]. Journal of Third Military Medical University, 2015, 37(21): 2156-2159
13. Zhao CL. Research on Mental fatigue Issues and Countermeasures of Knowledge Workers in SF Company [D]. Chongqing: Chongqing University of Technology 2021, 05.
14. Gavelin HM, Neely AS, Duns T, et al. Mental fatigue in stress-related exhaustion disorder: Structural brain corrrlates, clinical characteristics and relations with cognitive functioning [J]. Neuro Image Clin, 2020, 27: 102337.
15. Feng SM, Chang X, Chen W, et al. The Effects of Mental fatigue and Frame Types on Risk Decision-Making [J]. Journal of Xinxiang Medical University. 2021, 38(2): 156-160.
16. Li J, Li H, Wang H, et al. Evaluating the impact of mental fatigue on construction equipment operators' ability to detect hazards using wearable eye-tracking technology [J]. Automationin Construction, 2019, 105: 102835.
17. Grillon C, Quispe-Escudero D, Mathur A, et al. Mental fatigue impairs emotion regulation [J]. Emotion (Washington, D.C.), 2015, 15(3): 383-389.
18. Plass JL, Kalyuga S. Four ways of considering emotion in cognitive load theory [J]. Educational Psychology Review, 2019, 31(2): 339-359.
19. Wang DF, Xie XJ, Tian HY, et al. Mental fatigue and negative emotion among nurses during the COVID-19 pandemic [J]. Current Psychology, 2022, 41(11): 8123-8131.
20. Le Mansec Y, Pageaux B, Nordez A, et al. Mental fatigue alters the speed and the accuracy of the ball in table tennis [J]. Journal of Sports Sciences, 2018, 36(23): 2751-2759.
21. Migliaccio GM, Di Filippo G, Russo L, et al. Effects of mental fatigue on reaction time in sportsmen [J]. International Journal of Environmental Research and Public Health, 2022, 19(21): 14360.
22. Habay J, Uylenbroeck R, Van Droogenbroeck R, et al. Interindividual variability in mental fatigue-related impair ments in endurance performance: A systematic review and multiple meta-regression [J]. Sports Medicine-Open, 2023, 9(1): 14-14.
23. Jacquet T, Poulin-Charronnat B, Bard P, et al. Physical activity and music to counteract mental fatigue [J]. Neuroscience, 2021, 478: 75-88.
24. Hodas N O, Hunter J, Young SJ, et al. Model of cognitive dynamics predicts performance on standardized tests [J]. Journal of Computational Social

DOI: 10.5281/zenodo.18218226

Science, 2018, 1(2): 295-312.
25. Lehle C, Steinhauser M, Hübner R. Serial or parallel processing in dual tasks: What is more effortful? [J]. Psychophysiology, 2009, 46(3): 502-509.
26. Kudesia RS, Pandey A, Reina CS. Doing more with less: Interactive effects of cognitive resources and mindfulness training in coping with mental fatigue from multitasking [J]. Journal of Management, 2022, 48(2): 410-439.
27. Hofmann W, Schmeichel BJ, Baddeley AD. Executive functions and self-regulation [J]. Trendsin Cognitive Sciences, 2012, 16(3): 174-180.
28. Clarkson JJ, Otto AS, Hassey R, et al. Perceived mental fatigue and self-control [M]//Self- Regulation and Ego Control. Elsevier, 2016: 185-202.
29. Westgate EC, Wilson TD. Boring thoughts and bored minds: The MAC model of boredom and cognitive engagement [J]. Psychological Review, 2018, 125(5): 689-713.
30. Hockey GRJ. A motivational control theory of cognitive fatigue. [M]//Ackerman PL. Cognitive fatigue: Multidisciplinary perspectives on current research and future applications. Washington: American Psychological Association, 2011: 167-187.
31. Sun H, Soh KG, Mohammadi A, et al. Counteracting mental fatigue for athletes: a systematic review of the interventions. BMC Psychol, 2024 Feb 9;12(1):67.
32. Bartlett L, Martin A, Neil AL, et al. A systematic review and meta-analysis of workplace mindfulness training randomized controlled trials [J]. Journal of Occupational Health Psychology, 2019, 24(1): 108-126.
33. Cao S, Geok SK, Roslan S, et al. Mindfulness-based interventions for the recovery of mental fatigue: A systematic review [J]. International Journal of Environmental Research and Public Health, 2022, 19(13): 7825.
34. Coimbra DR, Bevilacqua GG, Pereira FS, et al. Effect of mindfulness training on fatigue and recovery in elite volleyball athletes: A randomized controlled follow-up study [J]. Journal of Sports Science & Medicine, 2021, 20(1): 1-8.
35. Kang Y, Gruber J, Gray JR. Mindfulness and de-automatization [J]. Emotion Review, 2013, 5(2): 192-201.
36. Smith MR, Thompson C, Marcora SM, et al. Mental fatigue and soccer: Current knowledge and future directions [J]. Sports Medicine, 2018, 48(7): 1525-1532.
37. Cao SD, Geok SK, Roslan S, et al. Mindfulness-Based Interventions for the Recovery of Mental Fatigue: A Systematic Review [J]. Int J Environ Res Public Health, 2022, 19(13): 7825.
38. Terry PC, Karageorghis CI, Curran ML, et al. Effects of music in exercise and sport: A meta-analytic review [J]. Psychological Bulletin, 2020, 146(2): 91-117.
39. Salimpoor VN, Benovoy M, Larcher K, et al. Anatomically distinct dopamine release during anticipation and experience of peak emotion to music [J]. Nature Neuroscience, 2011, 14(2):257-262.
40. Guo W, Ren J, Wang B, et al. Effects of relaxing music on mental fatigue induced by a continuous performance task: Behavioral and ERP sevidence [J]. PLoS ONE, 2015, 10(8): e0136446.
41. Juslin PN, Vastfjall D. Emotional responses to music: The need to consider underlying mechanisms [J]. Behavioral and Brain Sciences, 2008, 31(5): 559-575.
42. Koelsch S. Brain correlates of music-evoked emotions [J]. Nature Reviews Neuroscience, 2014, 15(3): 170-180.
43. Ding C, Geok SK, Sun H, et al. Does music counteract mental fatigue? A systematic review [J]. PLoS One, 2025, 20(1): e0316252.
44. Jacquet T, Poulin-Charronnat B, Bard P, et al. Physical activity and music to counteract mental fatigue [J]. Neuroscience, 2021, 478:75-88.
45. Jacquet T, Poulin-Charronnat B, Bard P, et al. Persistence of mentalfatigueon motor control [J]. Frontiersin Psychology, 2021, 11: 588253.
46. Li J, Lim J, Chen Y, et al. Mid-task break improves global integration of functional connectivity in lower alpha band [J]. Frontiers in Human Neuroscience, 2016, 10: 304-304.
47. Qi P, Gao L, Meng J, et al. Effects of rest-break on mental fatigue recovery determined by a novel temporal brain network analysis of dynamic functional connectivity [J]. IEEE Transactionson Neural Systems & Rehabilitation Engineering, 2020, 28(1): 62-71.
48. De Bloom J, Sianoja M, Korpela K, et al. Effects of park walks and relaxation exercises during lunch breaks on recovery from job stress: Two randomized controlled trials [J]. Journal of Environmental Psychology, 2017, 51: 14-30.
49. Loch F, Hof Zum Berge A, Ferrauti A, et al. Acute effects of mental recovery strategies after a mentally fatiguing task [J]. Frontiers in Psychology, 2020, 11: 558856
50. Loch F, Ferrauti A, Meyer T, et al. Resting the mind-a novel topic with scarce insights. considering potential mental recovery strategies for short rest periods in sports [J]. Performance Enhancement & Health, 2019, 6(3-4): 148-155.

DOI: 10.5281/zenodo.18218226