

Review

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Review

An Assessment Aid Intended for Psychiatrists Regarding 2025 Peer-Reviewed Publications on Brain Changes Associated with Burnout

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Abstract

Research on burnout has been a consistent and increasingly popular topic since the 1970s, when it was first defined. The focus of publications regarding burnout spans studies on various occupations, countries, age groups, social groups, and effects. A recent development is the documenting of brain changes associated with burnout. This review aims to investigate the peer-reviewed publications on this topic published in 2025. Although not a scoping review, because it is limited to one year and peer-reviewed reports, this study follows the standardized PRISMA guidelines for scoping reviews as the methodology. The search is of five relevant databases: Google Scholar, OVID, PubMed, Scopus, and Web of Science. "Brain changes" AND "burnout" AND "2025" are the keywords searched. The results are (1) the brain changes are various and (2) differ depending on the measurement tools for burnout assessment. The intention of investigating these results is to aid psychiatrists in identifying the most recent research to enhance patient treatment options by assessing the most current information on this developing topic.

Keywords: burnout; brain changes; psychiatrists; treatment options

1. Introduction

Burnout, a term originating in 1974 [1], arises in individuals who are strongly dedicated or committed to their job [2] and are overwhelmed by confronting work-related issues [3]. Emotional, mental, and physical fatigue is the result [4], causing a reduction in work engagement [5]. Burnout then represents a response to chronic workplace stress [6] such that job stress, lack of perceived social support when experiencing it, and lowered job satisfaction are predictors of burnout [7].

Since it was first defined, burnout has been a consistent and increasingly studied topic [8], focusing on various occupations [9–11], countries [12–14], age groups [15–17], genders [18–20], social groups [21–23], and effects [24–26]. A recent development is the documenting of brain changes associated with burnout [27–29]. This review aims to investigate peer-reviewed publications on burnout and brain changes published in 2025. The intention is to assist psychiatrists in assessing the most current research to enhance their patient treatment options for burnout regarding brain changes.

2. Materials and Methods

Although not a scoping review because the search is for the most recent year alone and only for peer-reviewed publications [30], this study follows the 2020 Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines for scoping reviews (PRISMA-ScR) [31,32] as it is internationally standardized [33] and represents the preferred process for scoping reviews [34].

One researcher conducted all aspects of the review. The following steps reduced the possibility of cognitive bias. (1) There was a registration of the protocol at <https://osf.io/6v59z/overview> on 31 January 2026. The DOI is 10.17605/OSF.IO/6V59Z at OSF Registries of the Centre for Open Science

[35]. (2) **Supplementary S1**—five database searches of 1 January 2026 for the keywords brain change AND burnout AND 2025—presents the results in order of their return for each search undertaken, checkable by any investigator. (3) **Supplementary S2**: Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist indicates the page number of each aspect of the review process. Supplementary S1 and Supplementary S2 are available for download at <https://osf.io/6v59z/overview>.

The searched databases were Google Scholar, OVID, PubMed, Scopus, and Web of Science. They were selected to search based on the topic and their high regard [36].

2.1. Database Searches

Table 1 presents the search order for the five database searches regarding the searched databases, search parameters, and the number of returns. Google Scholar returned the most (n = 380); next was Web of Science (n = 24). OVID followed with (n = 4). Scopus had one return, and PubMed none.

Table 1. Database, search parameters, and returns (#) of the 1 January 2026 search of five databases regarding burnout AND brain changes AND 2025 in their search order.

Database	Search Parameters	#
Google Scholar	Keywords: "Brain changes" "burnout" "2025" "English"	380
OVID	Keywords: Brain changes AND burnout AND 2025 Limits: English, Full text, Human	4
PubMed	Keywords: Brain changes AND burnout AND 2025	0
Scopus	Keywords: Brain changes AND burnout AND 2025	1
Web of Science	Keywords: Brain changes AND burnout AND 2025	24

2.2. Selection of Sources of Evidence

The search process of the five database searches is in Supplementary S1. The results of that process are in the standardized PRISMA flow diagram in Figure 1. The included studies are six. There was one investigation per article, equaling six reports. Google Scholar returned the first of these studies. Web of Science, the remaining five. No other database returned included studies.

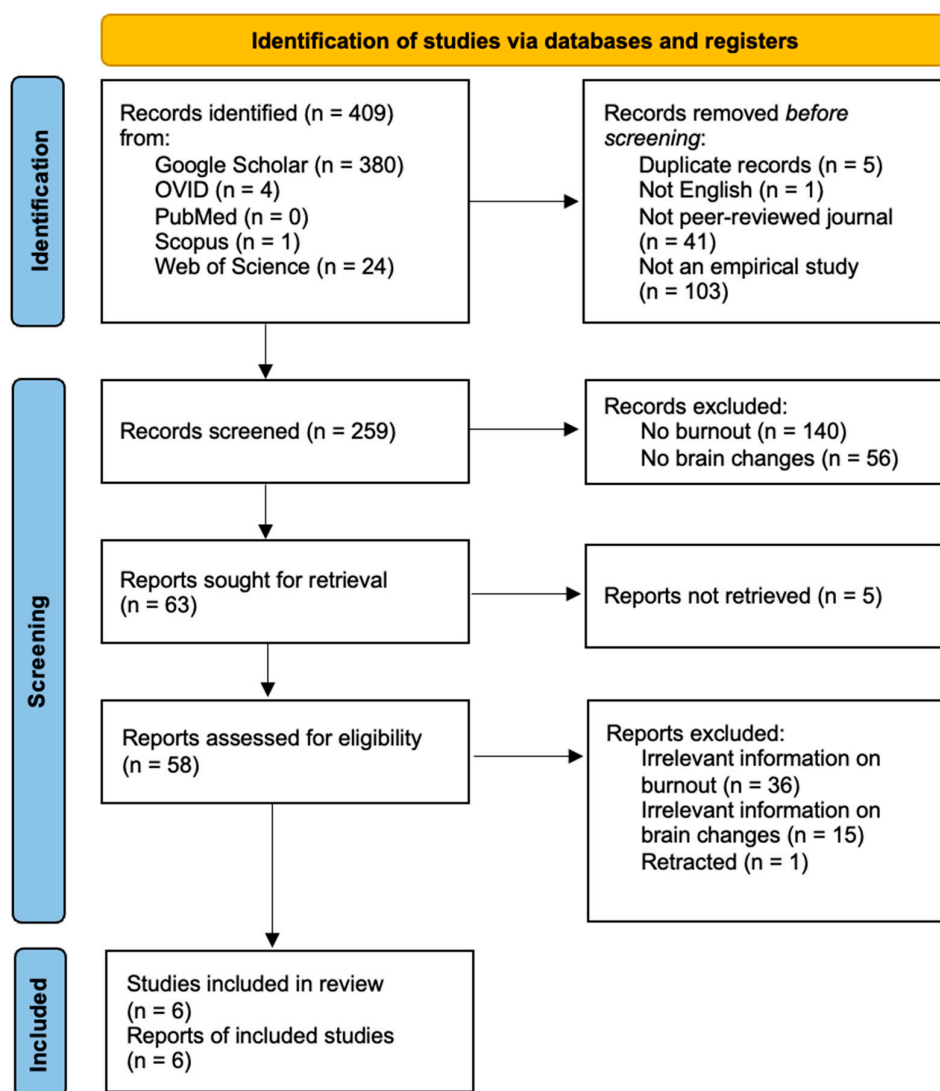


Figure 1. PRISMA 2020 flow diagram for new systematic reviews searches of databases. Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. The license of this work is under CC BY 4.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>.

2.3. Data Items and Summary

Table 2 summarizes the results of the exclusion process of the five database searches.

Table 2. Detailed results of the 1 January 2026 searches of five databases.

	Google Scholar	OVID	PubMed	Scopus	Web of Science
Duplicate Records		3			2
Not English	1				
Not in a Peer-Reviewed Journal	41				
Not an Empirical Study	93	1		1	8

No Burnout	140				
No Brain Changes	50			6	
Not Retrieved	5				
Irrelevant information on burnout	35			1	
Irrelevant information on brain changes	14			1	
Retracted					1
Included	1	0	0	0	5
Total Results	380	4	0	1	24

Of the 380 results for Google Scholar, 41 were in other than peer-reviewed journals (books, or government reports), 93 were not empirical studies (reviews, opinions, commentaries), 140 did not mention burnout (more than 1/3 of the results), 50 did not include mention of brain changes, five were not retrievable, 35 contained irrelevant information on burnout, and 14 on brain changes.

OVID had four returns. Three were duplicates of Google Scholar results. Additionally, the duplicated article was the same in each case. This result was possible because OVID combines several databases. The three identical results were from Embase Classic+Embase, Ovid Healthstar, and Books@Ovid. As a review, rather than an empirical study, this duplicated result [37] was part of those excluded in Google Scholar. One other return from the OVID search was also not an empirical study.

There were no PubMed returns, while Scopus had one that was not an empirical study. These results were regardless of there being no additional limits on the search for these databases. Based on the broadest search perspective possible, publications returned from these databases on this topic were lacking.

Web of Science had two duplicate records—one with Google Scholar and the other with Scopus. Neither was part of the included reports. Seven were not empirical studies, six did not mention brain changes, one contained irrelevant information on burnout, and another had the same regarding brain changes. Also eliminated was a retracted article.

3. Results

The PRISMA Checklist (Supplementary S2) results section includes four required sections and one optional (not completed for this review). The results of the first of these four completed sections are represented by Figure 1. The other three sections are (1) the characteristics of the sources of evidence, (2) the results of individual sources of evidence, and (3) a synthesis of the results. The subsections to follow regard each of these three sections of the PRISMA Checklist.

3.1. Characteristics of the Sources of Evidence

Referring to Table 3, the one result from Google Scholar was Burnout: At times a physical state [38]. The five results from Web of Science are, in order of their return, Functional connectivity in burnout syndrome: a resting-state EEG study [39], Abnormal intrinsic functional hubs and connectivity in nurses with occupational burnout: a resting-state fMRI study [40], Plasma BDNF in burnout-related depressive disorders: The mediating role of perceived social isolation and the biopsychological effect of a multimodal inpatient treatment [41], Neurobiological and emotional impact of occupational stress in frontline police officers: a neuroimaging and neurochemical study [42], and Neural Correlates of Well-Being in Young Adults [43].

Fewer than three authored only the Google Scholar report [38]. None of the articles was by the same research team.

One report alone was from a journal specific to psychiatrists (Australasian Psychiatry), another report was from a dedicated neuroscience journal (Frontiers in Human Neuroscience), a third was from a public health journal (Frontiers in Public Health), the last three are from journals focusing on

aspects of psychiatric practice (Journal of Affective Disorders Reports, European Journal of Psychotraumatology, and Emotion).

Table 3. Citation number (#), article title, authors, and journal of the six included studies from a 1 January 2026 search of burnout AND brain changes AND 2025 in five databases in their order of return.

#	Article Title	Authors	Journal
[38]	Burnout: At times a physical state	Parker & Russo	Australasian Psychiatry
[39]	Functional connectivity in burnout syndrome: a resting-state EEG study	Afek et al.	Frontiers in Human Neuroscience
[40]	Abnormal intrinsic functional hubs and connectivity in nurses with occupational burnout: a resting-state fMRI study	Liu et al.	Frontiers in Public Health
[41]	Plasma BDNF in burnout-related depressive disorders: The mediating role of perceived social isolation and the biopsychological effect of a multimodal inpatient treatment	La Marca et al.	Journal of Affective Disorders Reports
[42]	Neurobiological and emotional impact of occupational stress in frontline police officers: a neuroimaging and neurochemical study	Wang et al.	European Journal of Psychotraumatology
[43]	Neural Correlates of Well-Being in Young Adults	Green et al.	Emotion

3.2. Individual Sources of Evidence

Regarding the study aims represented in Table 4, the first two reports focused on burnout and brain changes [38,39]. The next four were focused on brain changes regarding stress disorders more generally, where burnout is included among these [40–43]. Except for the first return (with 720 total participants) [38], each of the other studies had fewer than 100 participants. One had 98 participants [39], and the others had between 40 and 33 participants potentially experiencing the type of stress associated with burnout [40–43]. In accordance with the Central Limit Theory, ($n = 30$) is the lower limit for such quantitative research [44]. As such, all of the studies were within this limit. Although publication of all the investigations was in 2025, only one of the studies reports the date of the study [40]. Lacking the date of study completion is a limitation of each of the other reports [45]. Four studies were conducted in Western countries (Australia [38], Poland [39], Switzerland [41], and the Netherlands [43]), while two were conducted in Asian countries (China [40], Taiwan [42]). All of these countries represent those where the type of stress resulting in workplace burnout is likely [46–49].

Table 4. Citation number (#), study aim, type of participants and their number, study date, and study location of the six included studies from a 1 January 2026 search of burnout AND brain changes AND 2025 in five databases in their order of return.

#	Study Aim	Participants	Study Date	Location
[38]	Considering burnout as comprising two states (burning out and being burned out), the evaluation of participants was regarding their associated physical symptoms.	317 burning out 403 burned-out adults	Not reported	Black Dog Institute, Australia
[39]	Investigating brain mechanisms in burnout syndrome by developing functional connectivity analysis separately in eyes-closed and eyes-open resting-state	98 participants, aged 25–55 years, 1.5 years	Not reported	Jagiellonian University, Kraków, Poland

	conditions for each Electroencephalogram (EEG) frequency band.	of work experience		
[40]	Investigating brain functional alterations in right-handed, female nurses, 20–40 years old, by comparing differences in statistically calculated degree centrality (DC) and subsequent functional connectivity (FC).	40 female nurses with burnout and 40 healthy controls	September 2024 to December 2024	Yancheng Clinical Medical College, China
[41]	Examining the association of plasma Brain-derived neurotrophic factor (BDNF) with burnout-related depressive disorders and the effect of multimodal inpatient treatment on BDNF levels.	35 inpatients at a specialized burnout clinic and 21 healthy controls	Not reported for the three time periods at least 6 months apart	University of Zurich, Switzerland
[42]	Examining the associations between occupational stress, emotional changes, brain morphology, and neurochemical alterations in frontline police officers compared to healthy controls.	33 frontline police officers and 36 demographically matched controls	Not reported	Taipei, Taiwan
[43]	Examining behavioral ratings during the functional magnetic resonance imaging (fMRI) task regarding associations with depressive symptoms, burnout, and feelings of uncertainty.	34 young adults	Not reported	Erasmus Medical Center, Rotterdam, Netherlands

3.2.1. Outcomes Regarding the Aim

Table 5 presents the outcomes highlighted for the study aim for each investigation. They concern the aim relevant to burnout. The measured outcomes for the six reports focus on different aspects of brain changes regarding burnout, which may not be the primary aim of the study.

Table 5. Citation numbers (#), outcomes of the aim, study type, and statistical significance of the results of the six included studies from a 1 January 2026 search of burnout AND brain changes AND 2025 in five databases in their order of return.

#	Outcomes Regarding Aim	Study Type	Significance
[38]	Headaches were reported by 89% of the sample, representing the symptom most often reported by those in the burning out group. Its high prevalence in early phase expression may suggest it as a marker of stress onset. In conjunction with falling ill such changes. reflect sustained hypothalamic–pituitary–adrenal (HPA) axis suppression of the immune system.	Quantitative questionnaire	‘Experiencing headaches’ had a higher prevalence among the ‘burning out’ group, while the remaining variables regarding illness were significantly more prevalent in the ‘burnt out’ group.
[39]	For the EEG recordings, the burnout group had high scores on the exhaustion and cynicism subscales and low scores on the self-efficacy subscale. Depression symptoms were significantly higher in the burnout group but mild; in the control group, minimal depression symptoms were observed.	Quantitative questionnaire and continuous dense-array EEG data from 256 channels	The significance of coherence values differences between the burnout group and control group was assessed separately for the eyes-open and eyes-closed conditions for each pair of channels within each frequency band.
[40]	Impaired integration between self-referential processing and reward/emotion regulation systems reduced DC in the precuneus. Coinciding with decreasing FC with the medial orbitofrontal cortex (mOFC), these represent key neural substrates of occupational burnout. There is considerable potential in neuroimaging biomarkers for the objective assessment of burnout..	Quantitative questionnaire and MRI scanning	Comparing the occupational burnout group to the healthy control group demonstrates there were significant reductions of DC within the bilateral precuneus, and decreased FC between the left precuneus and the right mOFC. Observed with the diagnostic accuracy of the integrated DC-FC mode, significant robust correlations with clinical burnout scales.

[41]	Between plasma Brain-Derived Neurotrophic Factor (BDNF) levels and depression severity, there was an inverse association demonstrated, such that plasma BDNF is likely an indicator of an underlying pathophysiology present in various stress-related disorders, e.g., burnout, and not merely as a specific biomarker of depression.	Quantitative questionnaire and blood samples	The effect of BDNF levels on Self-Compassion Scale (SCS)-Isolation was significant. This adverse effect indicates lower social isolation in inpatients with higher BDNF levels. From SCS-Isolation to the Hamilton Depression Rating Scale, 17-item version (HAMD-17), the path was also significantly positive, demonstrating a higher depression severity in inpatients experiencing higher social isolation. Although not for the direct path from BDNF levels on HAMD-17, the result of BDNF levels on HAMD was deemed significant.
[42]	Regarding changes in grey matter volume, neurotransmitter levels, and their correlations with emotional states, the significance of neurobiological impacts in high-stress professions, especially under conditions of high burnout, was highlighted.	Quantitative questionnaire and MRI scanning	Compared to controls, police participants exhibited significantly lower mean levels of excitatory neurotransmitters in the dorsal anterior cingulate cortex (dACC). These reductions were associated with medium effect sizes and remained statistically significant after correction for False Discovery Rate (FDR).
[43]	Increased activity was shown in neural results in the dorsolateral prefrontal cortex for the domain of 'dealing with stress' and the precuneus for the domains of 'positive family relations', compared to the other domains, which lacked specific neural patterns.	Quantitative questionnaire and MRI scan	A negative correlation existed between the mean score on wellbeing positivity ratings and the mean score on the desire for future changes in wellbeing, such that participants with lower wellbeing had a greater desire for future changes in their wellbeing across domains.

The first article [38] on the differences between those who consider themselves "burning out" and others who self-identify as burned out notes that a common precursor to burnout in those self-identifying as "burning out" is reported headaches. Of those tested, 89% experience them. That headaches produce structural and functional brain changes was reinforced recently in a review of Magnetic Resonance Imaging (MRI) Studies regarding burnout and the brain [50]. For those burned out, additional brain changes were regarding sustained hypothalamic–pituitary–adrenal (HPA) axis suppression of the immune system, leading to these individuals falling ill. A 2025 systematic review of burnout, when characterized by endocrine dysregulation and circadian disruption, noted its association with altered HPA-axis activity primarily [51].

In those who were burned out in the second study [39], the EEG recordings coincided with high scores of exhaustion and cynicism and low scores for self-efficacy. Similarly, depression in the burned-out group was significantly higher than in the control group. A 2025 systematic review of EEG and burnout identified EEG markers as valuable in complementing symptom scales for earlier diagnosis, treatment monitoring, and public-health surveillance [52].

In comparing differences in statistically calculated degree centrality (DC) and subsequent functional connectivity (FC) [40], for those with burnout, DC was reduced in the precuneus, resulting from impaired integration between self-referential processing and reward/emotion regulation systems. These represented essential neural substrates of burnout that can act as biomarkers for it when added with decreasing FC with the medial orbitofrontal cortex (mOFC). These findings coincide with recent similar research on DC and FC regarding burnout [50].

The idea that Brain-Derived Neurotrophic Factor (BDNF) levels are likely an indicator of an underlying pathophysiology present in burnout [41] is consistent with earlier research in this area from 2023 [27].

One report [42] recognized changes in grey matter volume and neurotransmitter levels as correlated with emotional states, specifically those leading to burnout. Support for this finding is part

of a review of earlier research—a mechanistic review of Magnetic Resonance Imaging (MRI) Studies—a study also from 2025 [50].

The role of the dorsolateral prefrontal cortex and precuneus in burnout, investigated in [43], is one that was first considered in combination in 2013 [53]. What is unexpected is that a search of “role of the dorsolateral prefrontal cortex and precuneus in burnout” on Google Scholar, 26 January 2026, produced a 2025 publication focused on this relationship and mentions both burnout and brain changes [54]. Yet, regarding the 1 January 2026 searches of “brain changes”, “burnout” AND “2025”, it was not a result of any of the searches performed.

3.2.2. Study Type

Also presented in Table 5 is the type of study for each publication. All the results were quantitative studies involving the analysis of a questionnaire. One regarded only a questionnaire for the analysis [38]. Another used the questionnaire in combination with EEG data [39]. Three studies relied on MRI scanning [40,42,43] in addition to the questionnaire. One used blood samples, along with the questionnaire [41].

The one study that did not use a supporting objective measure was [38]. The focus of this study was the headaches experienced by those who were burning out. This investigation was not seeking to establish the structural and functional brain changes resulting from burnout headache. The goal was to understand the extent of the problem, which was found to be substantial.

The relevance of EEG data regarding burnout is well-known and has been recently summarized in a 2025 mechanistic review of the topic [50].

MRI scanning is also an accepted method of testing in burnout research, covered additionally in [50].

Google Scholar was searched for 2025 publications of the “value of “blood samples” for burnout research regarding brain changes” on 26 January 2026. It was unanticipated that there would be a peer-reviewed result of this search indicating the relevance of blood samples in this regard [55]. Given that each of “brain changes” AND “burnout” AND “2025” was found in this article, it is unclear why it was not returned by any of the database searches on 1 January 2026. Unlike most of the results included from those searches, this study was dated. It took place from February to August 2021, as well as 3 and 6 months later, with the last date in March 2022.

3.2.3. Significance

Significance relates to the statistical tests performed (see Table 5). Only two studies stated directly that the tests yielded significant results [41,43]. Another referred to “a high prevalence rate” [38]. A fourth mentions “a potential neurological basis” [39], while a fifth reports a “definite causal relationship” [40]. The final report merely states that the changes were “evident” [42]. The value of statistical significance is for establishing that results are not due to chance [56,57]. However, it is not the only determinant of research quality. The design of the study can be rigorous, validly measured, and reliably executed, and still produce statistically non-significant results [56]. Each of the studies included meets these design criteria, although most do not report significant results.

3.3. Synthesis

The synthesis regards the specific findings of each study about either burnout or brain changes. Each of the included reports provided increased information regarding burnout unavailable before 2025. These results are found in Table 6.

Table 6. Citation number (#), burnout, and brain changes of the six included studies from a 1 January 2026 search of burnout AND brain changes AND 2025 in five databases in their order of return.

#	Burnout	Brain Changes
[38]	10% of the sample requiring hospital admission demonstrates the severity of burnout states in some individuals; however, the study questionnaire did not seek specific details on the reason for hospitalization.	Most of the symptoms evaluated had a high prevalence rate. As such, there should be greater recognition of burnout having distinctive physical symptom risks, including structural and functional brain changes.
[39]	For individuals experiencing occupational burnout compared with controls, the provision was a comprehensive examination of resting-state functional brain connectivity. The recommendation for burnout syndrome is using the "eyes-open condition" (EO) in further resting-state protocols.	In the EO resting state, the observed patterns suggest a potential neurobiological basis for burnout syndrome—one characterized by decreased functional connectivity in the alpha3 sub-band (11–13 Hz) in frontal and midline brain sections, particularly in the right frontal area.
[40]	A key facet of burnout is a positive relationship between precuneus-mOFC connectivity and personal accomplishment.	As a cross-sectional study, establishing a definitive causal relationship between the observed brain functional changes and the development of burnout was prevented. Hormonal fluctuations can impact emotional regulation and rs-fMRI signals, affecting brain function in the context of burnout.
[41]	The findings indicate various intervention possibilities to improve biopsychological well-being in inpatients experiencing burnout-related depressive disorders.	Inpatients with burnout-related depressive disorders exhibited lower BDNF levels than controls; however, inpatient treatment led to a significant increase in BDNF levels, with an inverse relationship between the change in BDNF levels and depression severity.
[42]	Compared to control participants, frontline police officers reported significantly higher levels of burnout and depressive symptoms.	Reduced grey matter volume and lower levels of the excitatory neurotransmitter glutamate were observed in police officers, indicating structural and neurochemical brain alterations.
[43]	All well-being domains and burnout ratings demonstrated negative associations. The desire for change in the domains of confidence, impact, and whether loved had positive associations with burnout ratings.	Contrasting each domain, there was whole-brain domain-specific activation. Contrasting "family" with "other" and "stress" with "other" resulted in significant effects.

3.3.1. Burnout

Although it was known as early as 2009 that burnout could lead to hospitalization for mental and cardiovascular disorders [58], what [38] offered as new information was that up to 10% of individuals could experience hospitalization. Although this study did not specify the reason for the hospitalization, another 2023 publication found that hospitalization resulted from problems in work relationships [59].

When providing a comprehensive examination of resting-state functional brain connectivity of burnout [39], the recommendation is for the "eyes open condition" (EO) in contrast to the "eyes closed condition" (EC). This finding reinforces the result of similar research begun in 2013 [60]. Research from 2019 found that the task condition significantly affects the results regarding these two conditions [61]. A 2023 paper concludes that EC tends to correlate with greater integration of brain connectivity, and EO with greater specialization [62].

Citation [40] found that a central factor regarding burnout is a positive relationship between precuneus-mOFC connectivity and personal accomplishment. It is the first study to find this connection. Although there are other publications on the connection between burnout and the precuneus [63], they do not regard mOFC connectivity.

The finding of [38] is that hospitalization may be necessary for those experiencing burnout. Therefore, the result of [41]—that various interventions have demonstrated success with burnout inpatients—is encouraging. This research is unique. Other recent studies on burnout and in-patients

concern burnout arising from being an in-patient, rather than burnout being the reason for the hospital admission [64,65].

In addition to the publications on burnout in specific types of employment [9–11], [42] identified that frontline police officers report significantly higher levels of burnout and depressive symptoms than controls. A 2025 systematic review and meta-analysis of this topic connected burnout in police officers to several post-traumatic stress disorders rather than depression [66].

The focus of the comparison between ratings of well-being and a desire for change in [43] is a new study concentration for burnout research. Other recent publications have prioritized promoting well-being and resilience to overcome burnout, rather than the desire to change [67–69].

3.3.2. Brain Changes

The first article cautions that burnout has distinctive physical symptom risks, including structural and functional brain changes, and these risks deserve greater recognition [38]. [40]—another of the included studies—represents a study that agrees that burnout brain changes are both structural and functional. However, in other cases, structural changes alone are recognized concerning burnout [37,70].

Citation [39] notes a potential neurobiological basis for burnout syndrome in the EO resting state, where the observed continuous dense-array EEG data patterns characterized by decreased functional connectivity in the alpha3 sub-band (11–13 Hz) in frontal and midline brain sections, particularly in the right frontal area, make this suggestion. This article represents the first to make this connection regarding brain changes.

Besides identifying that burnout results in structural and functional brain changes, [40] also finds that the impact of brain function in the context of burnout can be hormonal fluctuations. These differences result in rs-fMRI signal-identified changes to emotional regulation. This finding follows a 2024 publication on stress in general regarding subcortical networks. It concluded that the relationship between stress and connectivity changes was precise and functionally meaningful in balancing hormones [71].

The finding of [38] was 10% rate of hospitalization for the study population. [41] recognized that, of those hospitalized for burnout, they exhibited lower BDNF levels than controls. A positive outcome is that their inpatient treatment led to a significant increase in BDNF levels, decreasing their depression severity. That inpatient treatment was effective for burnout patients is particularly encouraging following a 2024 study published in 2025 that found the BDNF gene rs6265 and the FKBP5 gene rs1360780 may jointly contribute to an increased risk of burnout resulting from exposure to high childhood abuse [72]. As there is no direct mention of brain changes, the study results for this review do not include this paper.

Regarding the reduced grey matter volume and lower levels of excitatory neurotransmitter for structural and neurochemical brain alterations in burned-out police officers [42], citation [54] represents another publication on this topic returned in a 29 January 2026 Google Scholar search. This one is the second search that returned [54] as relevant. However, none of the 1 January 2026 searches regarding “brain changes” AND “burnout” AND “2025” included it. In contrast, another study from 2025—one that focused on perfectionism—recognized that, during situations of maladaptive perfectionism (that may result in burnout), glutamatergic activity tends to be excessive rather than reduced. This brain change leads to intensifying emotional responses and increasing self-criticism with fear of failure, contributing to a cycle of anxiety and chronic stress in perfectionist individuals [73].

Citation [43] was the only included result that specified burnout as a whole-brain related problem. However, it was not the first to do so, as a 2023 study investigated a whole-brain assessment for burnout [74]. The 2025 study added that significant whole-brain effects were those demonstrated by contrasting themes.

4. Discussion

A common element in all the included results is the use of a questionnaire to assess burnout, along with any additional empirical tests. The measurement tools employed varied. They included the Burnout Assessment Tool (BAT) and the Sydney Burnout Measure (SBM) [38], the Maslach Burnout Inventory—General Survey [39], the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) scale [40], the Maslach Burnout Inventory [41], the Copenhagen Burnout Inventory (CBI) for measuring workplace fatigue/burnout [42], and the Dutch version of the Maslach Burnout Inventory—Utrechtse Burnout Schaal Algemene versie (UBOS-A) [43]. None of the studies employed the same questionnaire to assess burnout.

The Burnout Assessment Tool (BAT) [75] and Sydney Burnout Measure (SBM) [76] are newer, comprehensive instruments of 4-7 dimensions. Both focus on broader cognitive and physical impairment. This focus is in comparison to the traditional Maslach Burnout Inventory (MBI) and Copenhagen Burnout Inventory (CBI), which test for exhaustion and cynicism [77,78]. BAT/SBM evaluate current severity and offer clinical depth, unlike MBI's frequency-based approach [79,80].

Although several inventories employed in the included studies are part of the MBI, they are unique. The Maslach Burnout Inventory (MBI) is a comprehensive term. The Maslach Burnout Inventory-Human Services Survey (MBI-HSS) is a specific 22-item version. Its design is for the service professions, such as healthcare, social work, and law enforcement. The MBI-HSS is considered the original, standard version in this regard [81]. In contrast, the Maslach Burnout Inventory—General Survey (MBI-GS) (16 items) is adapted for general occupations, focusing on exhaustion, cynicism, and professional efficacy [82]. The Dutch Utrechtse Burnout Schaal (UBOS-A), a version of the Maslach Burnout Inventory—General Survey (MBI-GS), is a validated adaptation measuring the same three-factor structure (exhaustion, cynicism, personal accomplishment) but consisting of 20 items, compared to the standard 22-item MBI (items for exhaustion, 5 for depersonalization/cynicism, and 8 for personal accomplishment) [83].

As such, when deciding on the questionnaire to employ as an inventory to assess burnout, it is necessary to determine the purpose of the assessment. For evaluating the current severity of burnout for clinical depth, the BAT [74] and SBM [75] can be used individually or in combination. In contrast, if the goal is to match the measurement tool with the occupation, the choice should be to employ a more precise measurement than the MBI—general occupations should use the (MBI-GS) and the helping professions should employ the (MBI-HSS). Although not employed by any of the included studies, the Educators Survey (MBI-ES) is an MBI designed for educators [84]. If there is a concern that understanding the country of origin would affect interpreting burnout, a tool such as the UBOS-A would be advised [83]. The MBI has been validated in many languages [82].

Whatever the treatment selection for burnout regarding brain changes, the choice of the appropriate questionnaire to initially assess the aspects demonstrated of burnout using either the CBI or MBI (using the relevant version for employment and nationality) will determine how the brain changes are measured [85], and knowing the severity of the burnout with the BAT/SBM will contribute to understanding, for example, if the treatment is best undertaken inpatient, outpatient in person, or via telehealth [86,87].

4.1. Limitations

As a review concerned with currency of publication, the date of the study would be a significant factor. Only one of the included reports [40] states the study date. Lacking the date of study completion in the remaining reports is a limitation for this 2025 review [45].

Keyword bias [88] can be a reason for a lack of returns from database searches. In cases where there might be a gap in the keywords, the advice is to search Google Scholar as a supplementary database [89]. Although one of the databases searched was Google Scholar, the returns were still limited, with the included returns from Web of Science significantly greater than those of Google Scholar. However, more concerning is that the keywords used were unable to return two relevant

articles [54,55] located with later searches that were not directly related to brain changes regarding burnout. Nevertheless, each of the keywords— “brain changes” AND “burnout” AND “2025”—was in these two publications. It is a limitation that all the searched databases missed them.

An additional limitation is that, in comparison to a systematic review and meta-analysis [90,91], this scoping review does not evaluate the sample sizes [92] or the validity of the measurement tools [93]. Selecting to follow the methodology of a scoping review was because the aim was to locate the extent of research on the topic published in 2025. The advice is to conduct a scoping review rather than a systematic review and meta-analysis for this type of analysis [30,94,95]. However, this choice then required following the PRISMA-ScR guidelines [33,94,96–98] for scoping reviews.

One researcher conducted the data charting process— a method that may create cognitive bias [99]. One reason for following PRISMA-ScR procedures for scoping reviews [32] was that this process mitigates possible cognitive bias. Supplementary S1 lists the returns from all five database searches, with the details of the reasons for exclusion and those included. This file is available to any researcher for examination. Another means of controlling cognitive bias for transparency is completing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) Checklist [31] of Supplementary S2.

4.2. Suggested Research Directions

The variety of topics investigating brain changes and burnout has progressed consistently. The 2025 publications make this result evident. What is lacking is a comprehensive examination of brain changes in burnout available from a single study. Researchers in 2025 used either the BAT/SBM or the CBI/MBI. The recommendation is to use both types of questionnaire to assess burnout. Additionally, the selection of the MBI should consider both occupation and nationality.

With more precise data from a broader and appropriate range of questionnaires, tailoring brain changes studies can anticipate the measures that are most likely to provide relevant and insightful findings. This review of 2025 publications identified that EEG data, MRI scanning, and blood samples each provide valuable information on the brain changes associated with burnout.

Learning that, as a result of burnout symptoms, 10% of participants in one study were hospitalized reinterprets the seriousness of burnout symptoms. Inpatient treatment programs were successful in reducing burnout. In part, this interpretation is a result of brain changes in hospital-based tests, suggesting that continuing research on inpatient treatment programs for burnout is advisable.

5. Conclusions

In investigating peer-reviewed publications on burnout and brain changes published in 2025, this review followed the PRISMA ScR guidelines, searching five databases. There were various recorded brain changes in the six peer-reviewed publications included regarding burnout. All studies employed questionnaires to assess the type or level of burnout in gauging the structural and functional brain changes. Additionally, five of the six reports employed another objective empirical method to determine the kind of brain change: EEG data, MRI scanning, or blood samples.

The research on this topic demonstrates that investigations on this new area of burnout research are ongoing and expanding in their reach and application. Regarding research on brain changes and burnout in 2025, various occupations and countries were investigated. In the future, an expansion of this area of investigation to compare age groups, genders, social groups, and the effects of burnout on brain changes can coincide with the current range of research on burnout alone.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org: Supplementary S1—five database searches of 1 January 2026 for the keywords brain change AND burnout AND 2025, and Supplementary S2: Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist.

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Abbreviations

The following abbreviations are used in this manuscript:

PRISMA	Preferred reporting items for systematic review and meta-analysis
ScR	Scoping review
EEG	Electroencephalogram
fMRI	Functional Magnetic Resonance Imaging
BDNF	Brain-derived neurotrophic factor
DC	Degree centrality
FC	Functional connectivity
HPA	Hypothalamic–pituitary–adrenal
mOFC	Medial orbitofrontal cortex
SCS	Self-Compassion Scale
HAMD-17	Hamilton Depression Rating Scale, 17-item version
dACC	Dorsal anterior cingulate cortex
FDR	False Discovery Rate
EO	Eyes open condition
EC	Eyes closed condition
BAT	Burnout Assessment Tool
SBM	Sydney Burnout Measure
MBI-HSS	Maslach Burnout Inventory–Human Services Survey
CBI	Copenhagen Burnout Inventory
UBOS-A	Utrechtse Burnout Schaal Algemene versie/ Dutch Utrechtse Burnout Schaal
MBI-GS	Maslach Burnout Inventory—General Survey
MBI-ES	Maslach Burnout Inventory— Educators Survey

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