

Emotional information processing in depression and burnout: an eye-tracking study

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Abstract Whether burnout is a form of depression is unclear. The aim of this study was to examine the relevance of the burnout–depression distinction by comparing attentional processing of emotional information in burnout and depression. Eye-tracking technology was employed for assessing overt attentional deployment. The gaze of 54 human services employees was monitored as they freely viewed a series of emotional images, labeled as dysphoric, positive, anxiogenic, and neutral. Similar to depression, burnout was associated with increased attention for dysphoric stimuli and decreased attention for positive stimuli. Hierarchical multiple regression analyses revealed that burnout no longer predicted these attentional alterations when depression was controlled for and vice versa, suggesting interchangeability of the two entities in this matter. To our knowledge, this study is the first to (a) investigate emotional attention in burnout and (b) address the issue of the burnout–depression overlap at both cognitive and behavioral levels using eye movement measurement. Overall, our findings point to structural similarities between burnout and depression, thus deepening concerns regarding the singularity of the burnout phenomenon.

Keywords Attention · Burnout · Depression · Emotional information · Eye tracking · Ocular movement

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Introduction

Burnout is usually regarded as a syndrome resulting from chronic occupational stress that combines emotional exhaustion, depersonalization, and reduced personal accomplishment [37, 38, 54]. Emotional exhaustion, the hallmark of burnout, defines a state of fatigue and helplessness; it reflects the worker's response to unresolvable stress and is considered the entry point into the syndrome; depersonalization characterizes a way of coping with emotional exhaustion by detaching oneself from one's work; reduced personal accomplishment, finally, refers to a feeling of failure toward the job and has been viewed as a deleterious consequence of depersonalization in the long run [38, 51]. Depression is primarily defined by anhedonia (relative inability to experience pleasure), depressed mood, and inhibition of action [4, 7, 34, 49] and has been causally related to both acute and chronic stress [3, 28, 29, 42, 60]. Depression is hypothesized to be critically related to the impossibility of acting gratifyingly and being in control in one's life [7, 34, 49].

Because of substantial etiological and symptom overlap, distinguishing burnout from depression has been challenging [1, 2, 10, 48, 59, 61]. Relatedly, the singularity of burnout is not consensually recognized. Whereas some investigators have advanced the view that burnout and depression are separate nosological entities [30, 40, 50], others have suggested that burnout may be a depressive syndrome [10, 55]. Establishing whether or not burnout is a form of depression is important, not only in terms of conceptual parsimony, but also because the use of the burnout label has been shown to increase the risk of leaving depressive disorders untreated [6]. Thus, the use of the burnout label may be problematic from a therapeutic viewpoint and mask the actual prevalence of depression in the workplace [31, 47].

Depression has been associated with altered cognitive processing of emotional information [5, 64]. More precisely, a growing body of research relying on eye-tracking technology suggests that depression in young- to middle-aged adults is marked by decreased attention for positive stimuli and increased attention for dysphoric stimuli [19, 32, 56]. The over-captivating aspect of dysphoric stimuli has been assumed to reflect a depression-typical difficulty in inhibiting mood-congruent material [17, 24]. The under-captivating aspect of positive stimuli has notably been imputed to an elevation of the reward threshold in depression, resulting in a difficulty deriving pleasure from “positive” content [13, 16, 18, 22, 23, 43]—turning into a relatively neutral piece of information, “positive” content would become less eye catching for the depressed individual. Interestingly, whether burnout is associated with similar alterations of attention is unknown. Because these attentional alterations are thought to be depression-specific—they are not observed, for example, in depression-related morbidities such as anxiety disorders—[24, 41], finding them in burnout would point out structural similarities between burnout and depression.

The aim of the present study was to further examine the burnout–depression overlap by comparing attentional processing of emotional information in burnout and depression. In line with the recent research dedicated to biased attention for emotional material in depression, eye tracking was employed for assessing overt attentional deployment during an image free-viewing task [19, 32, 56]. By allowing a virtually continuous recording of ocular behavior, eye-tracking technology makes possible a dynamic observation of the individual *in action*. Raising the question of the burnout–depression overlap at a cognitive and a behavioral level is likely to provide important information as to whether burnout should be considered a distinct nosological entity. If burnout is found to be associated with unique attentional alterations, this will bring evidence for the irreducibility of burnout to depression and pave the way to the identification of cognitive markers of burnout. On the contrary, if burnout turns out to be associated with depression-specific alterations of attention, this will prolong the questioning of burnout’s singularity to the key level of how individuals cognitively invest in and behave toward their emotional environment. Based on their etiological and symptom similarities, we expected burnout and depression to overlap in terms of emotional information processing. Evidence for burnout–depression overlap was anticipated to be provided by (a) the association of burnout and depression with similar visual search strategies, consisting in longer visual exploration of negative content and shorter visual exploration of positive content, and (b) the observation that models including *either* burnout *or* depression as a predictor explain as much

variance in the aforementioned attentional alterations as models combining burnout *and* depression as predictors.

Method

Study sample

A convenience sample of 54 human services employees took part in the present study (for the health and sociodemographic characteristics of the study sample, see Table 1). It is noteworthy that burnout was first described among human services employees [38]. Moreover, the level of burnout has been reported to be relatively elevated among these professionals [52]. To be eligible to participate, normal or corrected-to-normal vision was required; color blindness was an exclusion criterion. The study was carried out in accordance with the ethical guidelines of the Declaration of Helsinki. Special emphasis was placed on confidentiality and anonymity issues in order to reduce the risk of stress and self-censorship in participants.

Materials

Burnout was assessed with the Maslach Burnout Inventory (MBI; [37, 38]) and the Burnout Measure, Short Version (BM-SV; [45]). The MBI is considered the “gold standard” for the measurement of burnout [54]. The MBI assesses burnout as a three-dimensional entity made up of emotional exhaustion (9 items), depersonalization (5 items), and reduced personal accomplishment (8 items). Participants respond using a 7-point frequency scale (0–6). As recommended by MBI’s developers, a score was computed for each subscale and each dimension was examined separately [38]. In this study, Cronbach’s alphas indicated satisfactory internal consistencies for all three dimensions of burnout, with .93 for emotional exhaustion, .71 for depersonalization, and .81 for reduced personal accomplishment. The BM-SV is a 10-item questionnaire that assesses burnout as a one-dimensional entity consisting of exhaustion. Exhaustion is consensually viewed as the core of burnout [52]. As an illustration, exhaustion is the only dimension that is common to all conceptualizations of burnout (e.g., [33, 38, 57]). Each item of the BM-SV is associated with a 7-point frequency scale (1–7). In the present study, Cronbach’s alpha for the BM-SV reached .93. The BM-SV operationalizes one of the main conceptions of burnout and usefully provides the investigator with a global burnout index [46, 52]. Burnout is generally studied within a dimensional approach. There are currently no internationally established, clinically valid cutpoints for identifying cases of burnout [50, 63].

Table 1 Health and sociodemographic characteristics of the study sample

	Male (<i>n</i> = 17; 31 %)			Female (<i>n</i> = 37; 69 %)			Entire sample (<i>n</i> = 54; 100 %)			Student's <i>t p</i> value ^a
	M	SD	Range	M	SD	Range	M	SD	Range	
Age	39.47	9.75	26–57	41.49	11.63	21–60	40.85	11.02	21–60	>.50
LoE	13.35	8.25	1–29	13.95	11.03	.50–37	13.76	10.16	.50–37	>.20
MBI-EE (.../54)	17.12	13.48	1–44	21.05	12.29	3–47	19.81	12.68	1–47	>.25
MBI-DP (.../30)	5.35	6.53	0–25	5.08	4.00	0–18	5.17	4.87	0–25	>.85
MBI-RPA (.../48)	14.53	8.57	2–26	14.38	7.92	1–33	14.43	8.05	1–33	>.90
BM-SV (.../7)	3.29	1.30	1.30–6.10	3.82	1.00	1.80–5.80	3.66	1.12	1.30–6.10	>.10
BDI-II (.../63)	9.12	9.45	0–36	12.86	8.98	0–37	11.69	9.21	0–37	>.15
HADS-A (.../21)	7.35	3.82	0–17	9.32	4.46	3–19	8.70	4.33	0–19	>.10

LoE length of employment, *MBI-EE* Maslach Burnout Inventory-emotional exhaustion, *MBI-DP* Maslach Burnout Inventory-depersonalization, *MBI-RPA* Maslach Burnout Inventory-reduced personal accomplishment, *BM-SV* Burnout Measure-Short Version, *BDI-II* Beck Depression Inventory-II, *HADS-A* Hospital Anxiety and Depression Scale-Anxiety

^a The male part of the sample is compared to the female part of the sample

Depression was measured with the Beck Depression Inventory-II (BDI-II; [8]). The BDI-II is a 21-item instrument that has demonstrated strong psychometric properties and is widely used in depression research [44]. BDI-II's total scores (ranging between 0 and 63) are considered indexes of individual depressive symptoms. Scores of 12, 20, and 28 represent cutpoints for mild, moderate, and severe depression, respectively [9]. In this study, eight participants (15 %) showed mild depression, five participants (9 %) moderate depression, and five participants (9 %) severe depression. The remaining participants reported minimal levels of depression (scores less than 12). The BDI-II was associated with a Cronbach's alpha of .92, suggesting excellent internal consistency. The 7-item anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A; [65]) was administered as a complementary measure of negative affects (Cronbach's alpha: .86; total scores ranging from 0 to 21). Based on a cutpoint of 11 [65], clinical levels of anxiety were screened in 15 participants (28 %).

The image free-viewing task used in the present study was largely inspired from the tasks used in past research on emotional attention in depression [19, 32, 56]. The visual stimuli consisted in 18 slides, divided into 12 “study slides” (included in data analyses) and 6 “filler slides” (excluded from data analyses). Each study slide comprised four images corresponding to four different emotional categories: “dysphoric” (related to sadness and loss), “positive” (related to happiness and pleasure), “anxiogenic” (related to fear and threat), and “neutral” (emotionally uncharged). Negative images were subcategorized as dysphoric and anxiogenic to observe whether depression was associated with a general bias toward negative information or with a specific bias toward mood-congruent (or sadness-related) material. Image spatial arrangement was designed so that each emotional category was represented

an equal number of times in each corner of the screen across a session. Each filler slide contained four neutral images. The filler slides' function was to blur the objective of the study. The slides were displayed in random order. The task was programmed and driven using *Inquisit* software (Millisecond Software; Seattle, WA).

The 72 images used in the free-viewing task were selected from the International Affective Picture System (IAPS; [35]). IAPS images have standardized valence, arousal, and dominance (Table 2). The emotional category (dysphoric vs. anxiogenic) of the negative images used in this study had been established in past research [14, 20, 32].

Ocular behavior was recorded using an *Eye-Trac6* eye movement registration system (Applied Science Laboratories; Bedford, MA) based on bright pupil technology. Point-of-gaze, defined by the relative position of pupil center with respect to corneal reflection, was sampled every 16.67 ms. Gazes whose stability exceeded 100 ms within a visual angle of 1° were considered as fixations.

Procedure

Upon their arrival at the laboratory, participants were escorted to a soundproof room equipped for eye tracking and seated in a chair 60 cm from a 19-inch LCD color monitor. Participants first signed a consent form and filled in the BDI-II and the HADS-A. The eye tracker was then calibrated, and participants were informed that they were going to view a series of slides presented sequentially and automatically. They were asked to simply watch the slides as if, for example, they were looking at a photograph album. It was specified that a fixation target would appear before each slide, and participants were required to carefully stare at it on each occasion. The fixation target standardized the starting location of the gaze for each

Table 2 Characteristics of the images used as stimuli in the present study

Dysphoric images			Positive images			Anxiogenic images			Neutral images		
Valence M (SD)	Arousal M (SD)	Dominance M (SD)	Valence M (SD)	Arousal M (SD)	Dominance M (SD)	Valence M (SD)	Arousal M (SD)	Dominance M (SD)	Valence M (SD)	Arousal M (SD)	Dominance M (SD)
2.38 (.47)	4.93 (.48)	3.69 (.54)	7.44 (.39)	4.69 (.58)	6.27 (.35)	2.62 (.62)	6.54 (.57)	3.37 (.55)	5.08 (.18)	3.08 (.36)	5.74 (.39)

All images were selected from the International Affective Picture System (IAPS; [35]). The images from the IAPS have been evaluated in terms of valence (from “unpleasant” to “pleasant”), arousal (from “calm” to “excited”), and dominance (from “controlled” to “in control”) on 9-point scales

participant on each trial (see [32]). In line with past research, the slides were presented for 20 s [19, 32]. The display size of each slide was $41.50 \times 27.00 \text{ cm}^2$ (visual angles of 38.15° horizontally and 25.36° vertically), while the display size of each of the four images making up each slide was $14.60 \times 10.30 \text{ cm}^2$ (visual angles of 13.87° horizontally and 9.81° vertically). The fixation target had a diameter of 1.5 cm (visual angle of 1.43°) and was visible for 2 s prior to each trial. When the participants were ready to begin, the investigator ran the eye movement recording and the viewing task. Once the viewing task was over, participants completed the MBI, the BM-SV as well as sociodemographic and health forms. The division of the questionnaire session into two different parts (before and after the viewing task) was intended to make participants' experience less repetitive and more engaging.

Because individuals typically tend to direct their gaze toward stimuli that attract their attention (see [32]), fixation number and visual exploration duration on each type of images were used as indexes of participants' attention for each kind of emotional content. In addition, the locus of the initial fixation at each stimulus onset was scrutinized as an index of initial attentional orienting. Each image from the study slides was defined as an area of interest using *ASL Results* software (Applied Science Laboratories; Bedford, MA).

Data analyses

Data processing was carried out with *Statistical Package for the Social Sciences* version 20 (IBM; Armonk, NY). Emotional exhaustion, depersonalization, reduced personal accomplishment, global burnout, depression, and anxiety were defined as independent variables. Initial fixation location, fixation number, and exploration duration on dysphoric, positive, anxiogenic, and neutral images were defined as dependent variables. Correlations between independent and dependent variables were first computed. For each independent variable that correlated with first fixation location, fixation number, and/or exploration duration on at least one type of emotional stimuli, hierarchical multiple regression analyses were used in order to assess possible overlap between predicting factors. Statistical significance was defined by a *p* value of .05. We did not create groups to run categorical analyses given (a) the risk of participant overlap across the burnout and depression groups and (b) the fact that internationally established, clinically valid cutoff scores for defining cases of burnout are lacking [50, 63].

Results

The correlations between the health and sociodemographic characteristics of the study sample are presented in

Table 3 Correlation matrix of the health and sociodemographic characteristics of the study sample ($n = 54$)

	Gender	LoE	MBI-EE	MBI-DP	MBI-RPA	BM-SV	BDI-II	HADS-A
Age	-.09	.83	.07	-.31	.09	.13	-.01	-.02
Gender		-.03	-.15	.03	.01	-.22	-.19	-.21
LoE			-.22	-.25	.07	-.12	-.23	-.22
MBI-EE				.49	.39	.91	.79	.67
MBI-DP					.29	.47	.42	.38
MBI-RPA						.45	.38	.32
BM-SV							.81	.70
BDI-II								.79

LoE length of employment, MBI-EE Maslach Burnout Inventory-emotional exhaustion, MBI-DP MBI-depersonalization, MBI-RPA MBI-reduced personal accomplishment, BM-SV Burnout Measure-Short Version, BDI-II Beck Depression Inventory-II, HADS-A Hospital Anxiety and Depression Scale-Anxiety

Bolded correlation coefficients are significant at $p < .05$

Table 4 Correlations between burnout, depression, anxiety, and exploration durations on each type of emotional image ($n = 54$)

	ED (%) on dysphoric images	ED (%) on positive images	ED (%) on anxiogenic images	ED (%) on neutral images
MBI-EE	.32	-.29	.14	-.06
MBI-DP	.00	-.09	.07	.06
MBI-RPA	.05	-.14	.15	.01
BM-SV	.29	-.31	.16	.01
BDI-II	.30	-.28	.18	-.11
HADS-A	.21	-.18	.11	-.11

ED exploration duration, MBI-EE Maslach Burnout Inventory-emotional exhaustion, MBI-DP Maslach Burnout Inventory-depersonalization, MBI-RPA Maslach Burnout Inventory-reduced personal accomplishment, BM-SV Burnout Measure-Short Version, BDI-II Beck Depression Inventory-II, HADS-A Hospital Anxiety and Depression Scale-Anxiety

Bolded correlation coefficients are significant at $p < .05$

Table 3. Because correlations between fixation number and exploration duration ranged from .95 to .99 depending on the type of images, we only report results related to exploration duration. Age, length of employment, and gender were not associated with exploration durations on any type of image. The emotional exhaustion component of burnout (as assessed with the MBI), global burnout (as assessed with the BM-SV), and depression (as assessed with the BDI-II) were significantly correlated with exploration durations on dysphoric and positive images, all $ps < .05$ (Table 4). Anxiety and the depersonalization and reduced personal accomplishment components of burnout were not related to attention distribution. No independent variable was found to correlate with first fixation location.

Hierarchical multiple regression analyses indicated that global burnout (as assessed with the BM-SV) no longer predicted exploration durations on either dysphoric or positive images when depression (as assessed with the

Table 5 Results from hierarchical multiple regressions

Models	Exploration duration on dysphoric images			Exploration duration on positive images		
	r^2	Change in r^2	p value	r^2	Change in r^2	p value
Depression	.09	–	.03	.08	–	.04
Emotional exhaustion	.11	.02	.30	.09	.01	.40
Depression	.09	–	.03	.08	–	.04
Global burnout	.10	.01	.50	.10	.02	.29
Emotional exhaustion	.10	–	.02	.08	–	.03
Depression	.11	.01	.54	.09	.01	.51
Global burnout	.09	–	.03	.10	–	.02
Depression	.10	.01	.39	.10	.00	.65

Special focus is placed on the changes in the parts of explained variance (r^2)

Depression was assessed with the Beck Depression Inventory-II, emotional exhaustion with the Maslach Burnout Inventory, and global burnout with the Burnout Measure, Short Version

BDI-II) was controlled for and vice versa, all $ps > .25$. Similar results were obtained with the emotional exhaustion component of burnout (as assessed with the MBI) replacing global burnout among the predictors, all $ps > .30$. Two-factor models, including burnout and depression, did not explain more variance in attentional alterations than one-factor models, including either burnout or depression as the predicting factor (Table 5).

Discussion

Attentional processing of emotional information was compared in burnout and depression with the objective of

examining the distinctiveness of burnout. The gaze of participants was monitored as they freely viewed a series of emotional images. Similar to depression, burnout was associated with increased attention for dysphoric stimuli and decreased attention for positive stimuli. These results emerged when using a global burnout index (based on the BM-SV) and a measure of emotional exhaustion (based on the MBI) as independent variables. Hierarchical multiple regression analyses suggested interchangeability of burnout and depression in the prediction of the observed attentional alterations. To our knowledge, this study is the first to (a) address the issue of emotional attention in burnout and (b) raise the question of the burnout–depression overlap at a cognitive and a behavioral level using eye-tracking technology.

The association observed between depression and altered attention for emotional images is consistent with past findings [19, 21, 32, 56]. Anxiety was not associated with biased attention for either positive or dysphoric stimuli, supporting the idea that these attentional alterations are disorder-specific rather than related to a general disposition toward negative affectivity [25, 58, 62]. The association of burnout with depression-specific attentional alterations points to structural similarities between the two entities. This substantiates the argument that burnout is uncomfortably close to depressive symptomatology (see [59]; see also [55]), especially in a context where burnout and depression appear to be interchangeable predictors of the observed cognitive and behavioral changes.

Contrary to the emotional exhaustion component of burnout, the depersonalization and reduced personal accomplishment components were not correlated with exploration duration on any of the four types of emotional images (dysphoric, positive, anxiogenic, and neutral). These findings are consistent with the results from meta-analyses showing that burnout's components (as assessed with the MBI) are differently related to a variety of study variables ([36, 52]; see also [15]). Given that depersonalization is supposedly designed to cope with emotional exhaustion [38], it is not surprising that depersonalization and emotional exhaustion may play divergent roles with respect to emotional information processing. The absence of relationship between reduced personal accomplishment and altered attention for dysphoric or positive stimuli corroborates the view that reduced personal accomplishment may actually not be part of the burnout syndrome [26, 53]. In any case, emotional exhaustion being both the heart and the entry point into burnout [38], its association with depression-specific attentional alterations confirms that burnout shares key characteristics with depression, as evidenced when a global burnout index (based on the BM-SV) is taken for reference.

Attention for emotional information in depression and burnout was found to be altered at the level of exploration

duration but not at the level of initial fixation location. This confirms that emotional attention in depression is biased at late rather than early stages of information processing [24, 39]. This study documents a similar tendency in burnout.

It is worth noting that in the present study, attention in burnout was found to be altered toward work-unrelated content. This suggests that burnout is more pervasive and less situation-specific than frequently posited (e.g., [38]), impacting the individual's behavior and cognition far beyond the occupational sphere. This finding supports the view that a job-restricted approach to burnout is misguided and further questions the relevance of a scope-based distinction between burnout and depression [12, 27].

At least three limitations to the present study should be mentioned. First, although gender was not associated with exploration durations on any type of image, more than two of three participants were female, making it difficult to generalize results beyond women. Second, the sample size ($n = 54$) was relatively small, further restricting the external validity of the study. Third, even if two different conceptualizations of burnout were examined in the present work—including the field-dominating one [38], other views of burnout exist (e.g., [33, 57]) and should be tested in their own right in the future.

Burnout and depression show common symptoms and etiological pathways [1, 3, 10, 11, 48, 55, 60]. Based on behavioral measures of attentional deployment, the present study suggests that the overlap of burnout with depression extends to the cognitive processing of emotional information. Overall, these findings raise concerns regarding the singularity of the burnout phenomenon.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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