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Memory bias toward emotional information in burnout and depression

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Abstract

A sample of 1015 educational staff members, exhibiting various levels of burnout and depressive symptoms, underwent a memory test involving incident encoding of positive and negative words and a free recall task. Burnout and depression were each found to be associated with increased recall of negative items and decreased recall of positive items. Results remained statistically significant when controlling for history of depressive disorders. Burnout and depression were not related to mistakes in the reported words, or to the overall number of recalled words. This study suggests that burnout and depression overlap in terms of memory biases toward emotional information.

Keywords

burnout, cognition, depression, emotion, memory bias, stress

Burnout has been defined as a long-term affective state consisting of physical fatigue, cognitive weariness, and emotional exhaustion and resulting from unresolvable job stress (Shirom and Melamed, 2006). To date, burnout has become a focal object of investigation in occupational health research (Maslach et al., 2001). However, many gray areas surround the construct. A nodal point of debate in the literature concerns the extent to which burnout reflects anything other than a depressive condition (Bianchi et al., 2017). Indeed, there has been mounting evidence that burnout overlaps with depression at a symptom and an etiological level (e.g. Bianchi and Brisson, 2017).

In recent years, occupational health researchers have started to examine the burnout–depression distinction in terms of the cognitive processing of emotional information. Within this subfield of research, burnout has been related to increased attention for dysphoric stimuli and decreased attention for positive stimuli, an attentional pattern that is typical of depression (Bianchi and Laurent, 2015; De Raedt and Koster, 2010). In addition, burnout has been, like depression, associated with dysfunctional attitudes (e.g. pathological perfectionism and need for approval), ruminative responses, and pessimistic attributions (Beck, 2008; Bianchi and Schonfeld, 2016; Rubenstein et al., 2016). Although growing, research on how individuals

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with burnout symptoms process emotional information is still in its infancy. To our knowledge, no study investigated emotional memory in burnout thus far.

The aim of this study was to examine whether burnout parallels depression in terms of memory biases toward emotional information. As observed by Gotlib and Joormann (2010), "preferential recall of negative compared to positive material is one of the most robust findings in the depression literature" (p. 292), especially when free recall tasks, involving explicit memory, are used (see also Everaert et al., 2014). Along with other cognitive alterations (e.g. at attentional and interpretational levels), memory biases are thought to play a role in the onset, maintenance, and recurrence of depression (Laurent et al., 2018; Sanchez et al., 2017). Based on the finding that burnout and depression overlap in terms of symptomatology and etiology (Bianchi et al., 2018), we hypothesized that individuals with burnout symptoms would exhibit biased memory for negative, over positive, information. Better understanding the cognitive alterations that characterize burnout is important both from a theoretical standpoint (e.g. for determining whether the burnout construct refers to a phenomenon that is different from depression) and a practical standpoint (e.g. to design effective prevention and treatment strategies).

Methods

Study sample and recruitment procedure

A convenience sample of 1015 French educational staff, employed in the areas of Amiens and Grenoble, was recruited for the purpose of this study (89% female). The sample comprised teachers (83%), professionals having both teaching and supervisory charges (7%), administrators (6%), and administrative assistants (1%). The remaining participants were working as education assistants, education advisers, school psychologists, accountants, and school nurses.

Participants were reached by email through contacts with nearly 6000 schools in November and December 2017. The only eligibility criterion for participating in the study was to be currently employed as an educational staff member in an elementary school, a middle school, or a high school. Educational staff, most notably teachers, have been found to be exposed to adverse work environments and are often mobilized in research on burnout and depression (Maslach et al., 2001; Schonfeld, 2001). Cognitive biases are particularly worth examining among such professionals given the relational aspect of their work and the potential impact of cognitive biases on variables such as students' assessment (e.g. Brackett et al., 2013).

Participants took part in a web-based study, designed and administered with Qualtrics®. Web-based studies have been shown to be methodologically viable and particularly useful to ensure satisfactory statistical power (Birnbaum, 2004; Gosling et al., 2004; Horton et al., 2011). Participation was entirely voluntary. Confidentiality was guaranteed to each participant. Respondents were informed that, by completing the survey, they were giving consent to their inclusion in the study. Participants' mean age was 40.88 years (standard deviation (SD) = 9.41), with a mean length of employment of 14.38 years (SD = 9.48).

We note that our recruitment procedure did not allow us to estimate the response rate to our study. Indeed, while the number of contacted schools was known, we had no information on the number of educational staff members who got actual access to our study.

Self-report measures

The Shirom-Melamed Burnout Measure (SMBM; Shirom and Melamed, 2006) was used for assessing burnout symptoms (Cronbach's $\alpha = 0.92$). The SMBM consists of three subscales, namely, physical fatigue (six items; e.g. "I feel physically drained."), cognitive weariness (five items; e.g. "My thinking process is slow."), and emotional exhaustion (three items; e.g. "I feel I am unable to be sensitive to the

needs of coworkers and students."). Respondents reported the symptoms experienced over the past 2 weeks using a 4-point scale (from 1 for "not at all" to 4 for "nearly every day"). A principal axis factor analysis (PFA) with promax rotation was conducted to reexamine the structure of the SMBM. Three factors emerged from the PFA, corresponding to the physical fatigue, cognitive weariness, and emotional exhaustion subscales of the questionnaire (explained variance: 68%; Kaiser-Meyer-Olkin measure of sampling adequacy = 0.92; Bartlett's test of sphericity: $p < 0.001$). In contrast with other measures of burnout such as the Maslach Burnout Inventory (Maslach et al., 2001), the SMBM is in the public domain and reflects a theory-based and conceptually homogeneous view of burnout (Brisson and Bianchi, 2017; Schears, 2017; Shirom and Melamed, 2006).

Depressive symptoms were assessed with the PHQ-9 (Kroenke et al., 2001; Cronbach's $\alpha = 0.82$). The items of the PHQ-9 target each of the nine diagnostic criteria for major depressive disorder (e.g. anhedonia, depressed mood) of the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (American Psychiatric Association, 2013). Respondents employed a 4-point scale (from 1 for "not at all" to 4 for "nearly every day"). Participants' symptomatology was examined over the past 2 weeks. A PFA with promax rotation revealed a two-factor structure, corresponding to the cognitive–affective symptoms of depression on the one hand, and the somatic symptoms of depression on the other hand (explained variance: 40%; Kaiser-Meyer-Olkin measure of sampling adequacy = 0.87; Bartlett's test of sphericity: $p < 0.001$). Similar results were found in a factor-analytic study of the PHQ-9 conducted among psychiatry patients (Beard et al., 2016).

Participants were additionally asked to report their age, sex, occupation, length of employment, and history of depressive disorders. This latter variable was assessed with the following item: "Have you ever been diagnosed for a depressive disorder by a health professional (e.g. a general practitioner, a psychiatrist, a psychologist)? Answer 'Yes' only if this diagnosis has resulted in treatment with medication and/or psychotherapeutic treatment." The second part of the item was intended to limit the risk of false-positive report.

Memory test

Participants underwent a memory test involving incident encoding and an immediate free recall task (Gotlib and Joormann, 2010; Turk-Browne et al., 2006). Participants were presented with 10 positive words and 10 negative words adapted from the Positive and Negative Affect Schedule (Gaudreau et al., 2006; Watson et al., 1988).[1] Participants were only instructed to silently read each of the words displayed. Each word was displayed for 3 seconds. Word presentation was randomized. The mean number of syllables was 2.5 for both positive and negative words. Right after the word presentation, the participants were requested to recall as many words as possible. They were given 1 minute to read the recall task instructions and write down the recalled words. The memory test was placed at the beginning of the protocol in order to avoid possible interferences with the other materials used in the study (e.g. the words contained in the SMBM and the PHQ-9).

Data analyses

We examined the relationships among our variables of interest using bivariate and partial correlation analyses, Student's t test, Pearson's chi-square test, Fisher's exact test, multivariate analysis of variance (MANOVA), and multivariate analysis of covariance. Seven dependent variables were defined on the basis of the memory test: the number of recalled positive words; the number of recalled negative words; the percentage of recalled positive words; the percentage of recalled negative words; the number of mistakes (reported words that were not in the presented list); the percentage of mistakes; and the overall number of recalled items.

With the objective of comparing individuals scoring at the lower and upper ends of the burnout and depression continua, we created a "low

depression," a "high depression," a "low burnout," and a "high burnout" group. As a reminder, burnout and depression were *both* assessed using a 4-point scale ranging from 1 for "not at all" to 4 for "nearly every day." The "low depression" group was defined by a PHQ-9 mean score < 2, whereas the "high depression" group was defined by a PHQ-9 mean score ≥ 3. On a similar basis, the "low burnout" group was defined by an SMBM mean score < 2, whereas the "high burnout" group was defined by an SMBM mean score ≥ 3. Thus, the "low depression" and "low burnout" groups included individuals who seldom, if ever, experienced symptoms over the past 2 weeks—symptoms experienced less than *several days*—whereas the "high depression" and "high burnout" groups included individuals who experienced symptoms *more than half the days* over the past 2 weeks (i.e. individuals with rather pervasive symptoms). By assessing burnout and depression with identical response options and categorizing burnout and depression on the basis of identical cut-points, we were able to compare burnout and depression in a consistent fashion.

In order to classify the words reported by our participants during the memory test, we conducted an automatic content analysis with LWIC2007 (Pennebaker et al., 2007), using a custom dictionary (positive terms: *intéressé, excité, fort, enthousiaste, fier, vif, inspiré, déterminé, attentif*, and *actif*; negative terms: *angoissé*, *fâché, coupable, effrayé, hostile, irritable, honteux, nerveux, agité*, and *apeuré*). For verification purposes, inter-rater agreement with a human coder was examined for a quarter of the corpus. A 100 percent agreement was obtained.

Results

Correlations among the main study variables

Bivariate correlations among the main study variables are displayed in Table 1. Burnout was found to correlate strongly with depression, $r = 0.73$, $p < 0.001$ (disattenuated correlation: 0.84). Burnout and depression each correlated

Table 1. Means (*M*), standard deviations (*SD*), and zero-order correlations among the main study variables ($N = 1015$).

	M	*SD*	2	3	4	5	6	7	8	9	10	11	12	13
1 Depressive symptoms (1–4)	1.73	0.53	*0.73*	*–0.15*	*0.19*	*–0.25*	*0.24*	0.04	0.01	–0.04	–0.02	–0.03	–0.04	*0.18*
2 Burnout symptoms (1–4)	1.92	0.60	–	*–0.18*	*0.18*	*–0.26*	*0.25*	0.05	0.04	0.02	0.04	–0.05	0.04	*0.14*
3 Recalled positive words (*n*)	3.53	1.42		–	–0.00	*0.71*	*–0.43*	–0.02	*–0.37*	0.06	*–0.12*	*–0.08*	*–0.09*	–0.03
4 Recalled negative words (*n*)	2.97	1.42			–	*–0.52*	*0.81*	0.01	*–0.34*	0.02	*–0.13*	–0.02	*–0.06*	*0.07*
5 Recalled positive words (%)	49.30	16.78				–	*–0.69*	–0.02	*–0.42*	0.06	–0.01	–0.05	–0.03	–0.06
6 Recalled negative words (%)	40.75	16.42					–	0.00	*–0.37*	–0.01	–0.04	0.02	–0.01	*0.09*
7 Mistakes (*n*)	0.70	0.93						–	0.02	*0.12*	0.03	–0.02	–0.05	0.01
8 Mistakes (%)	9.95	13.18							–	*–0.06*	*0.07*	0.03	0.05	–0.04
9 Total word count (*n*)	7.20	1.89								–	–0.00	0.02	0.00	–0.02
10 Age (in years)	40.88	9.41									–	0.06	*0.80*	*0.13*
11 Sex (0/1)	0.11	0.32										–	0.03	*–0.06*
12 Length of employment (in years)	14.38	9.48											–	*0.10*
13 History of depressive disorders (0/1)	0.29	0.45												–

Italicized correlation coefficients are significant at $p < 0.05$. Sex was coded 0 for "female" and 1 for "male." History of depressive disorders was coded 0 for "absent" and 1 for "present."

(a) negatively with the number and the percentage of recalled positive words and (b) positively with the number and the percentage of recalled negative words. Burnout and depression were not associated with mistakes in the reported items, the overall number of recalled items, or any of the other variables under consideration except history of depressive disorders. The correlations of burnout and depression with the recalled emotional words remained statistically significant, and almost unchanged, when history of depressive disorders was controlled for.

"Low depression" group versus "high depression" group

The characteristics of the depression-related groups are presented in Table 2. A first MANOVA showed an effect of group membership on the number of recalled positive and negative words, Pillai's Trace = 0.03, $F(2, 740) = 10.35$, $p < 0.001$ (Box's $M = 1.33$, $p = 0.73$). Participants in the "low depression" group recalled (a) a greater number of positive words ($M = 3.65$, $SD = 1.40$) than participants in the "high depression" group ($M = 2.67$, $SD = 1.24$), Cohen's $d = 0.74$, and (b) a smaller number of negative words ($M = 2.82$, $SD = 1.39$) than participants in the "high depression" group ($M = 3.50$, $SD = 1.33$), Cohen's $d = 0.50$. The effect of group membership on the number of recalled positive and negative words remained statistically significant when history of depressive disorders was introduced as a covariate (effect size reduced by 7%) but not when burnout symptoms were controlled for ($F(2, 739) = 1.65$, $p = 0.19$).

A second MANOVA revealed an effect of group membership on the percentage of recalled positive and negative words, Pillai's Trace = 0.03, $F(2, 740) = 10.92$, $p < 0.001$ (Box's $M = 3.81$, $p = 0.29$). Participants in the "low depression" group recalled (a) a greater percentage of positive words ($M = 51.44$, $SD = 16.98$) than the participants in the "high depression" group ($M = 38.36$, $SD = 14.57$), Cohen's $d = 0.83$, and (b) a smaller percentage of negative words ($M = 38.76$, $SD = 16.54$) than the participants in the "high depression" group

Table 2. Characteristic of the depression- and burnout-related groups.

	Depression-related groups						Burnout-related groups					
	"Low depression" ($n = 713$)		"High depression" ($n = 30$)				"Low burnout" ($n = 603$)		"High burnout" ($n = 71$)			
	M	*SD*	*M*	*SD*	*p* value	Cohen's *d*	*M*	*SD*	*M*	*SD*	*p* value	Cohen's *d*
Depressive symptoms (1–4)	1.44	0.25	3.23	0.23	<0.001	7.45	1.46	0.34	2.59	0.50	<0.001	2.64
Burnout symptoms (1–4)	1.68	0.45	3.00	0.56	<0.001	2.60	1.51	0.27	3.27	0.24	<0.001	6.89
Age (in years)	41.01	9.28	44.13	9.59	0.07	0.33	40.68	9.47	43.69	8.36	0.01	0.34
Length of employment (in years)	14.54	9.37	15.14	9.56	0.73	0.06	14.09	9.36	16.70	8.41	0.03	0.29
Female sex	88%		73%		0.04	0.38	87%		86%		0.72	0.03
History of depressive disorders	26%		57%		<0.001	0.66	25%		46%		<0.001	0.45

M: mean; *SD*: standard deviation.
Between-group comparisons were conducted using Student's *t* test and Pearson's chi-square test. Fisher's exact test was used with the "female sex" variable in depression-related groups because one cell (25%) had expected count less than 5 (Field, 2009, p. 692).

($M=52.31$, $SD=15.93$), Cohen's $d=0.83$. The effect of group membership on the percentage of recalled positive and negative words remained statistically significant when history of depressive disorders was introduced as a covariate (effect size reduced by 10%) but not when burnout symptoms were controlled for ($F(2, 739)=1.52$, $p=0.22$).

We found no effect of group membership on the number of mistakes ($p=0.89$), the percentage of mistakes ($p=0.85$), or on the total word count ($p=0.87$).

"Low burnout" group versus "high burnout" group

The characteristics of the burnout-related groups are presented in Table 2. A first MANOVA showed an effect of group membership on the number of recalled positive and negative words, Pillai's Trace = 0.05, $F(2, 671)=16.04$, $p<0.001$ (Box's $M=7.23$, $p=0.05$). Participants in the "low burnout" group recalled (a) a greater number of positive words ($M=3.73$, $SD=1.42$) than the participants in the "high burnout" group ($M=2.90$, $SD=1.33$), Cohen's $d=0.60$, and (b) a smaller number of negative words ($M=2.80$, $SD=1.39$) than the participants in the "high burnout" group ($M=3.38$, $SD=1.31$), Cohen's $d=0.43$. The effect of group membership on the number of recalled positive and negative words remained statistically significant when history of depressive disorders was introduced as a covariate (effect size reduced by 11%) and also when depressive symptoms were controlled for, although the effect size was dramatically reduced (by 80%).

A second MANOVA revealed an effect of group membership on the percentage of recalled positive and negative words, Pillai's Trace = 0.05, $F(2, 671)=16.35$, $p<0.001$ (Box's $M=6.71$, $p=0.08$). Participants in the "low burnout" group recalled (a) a greater percentage of positive words ($M=52.50$, $SD=17.18$) than the participants in the "high burnout" group ($M=40.95$, $SD=14.08$), Cohen's $d=0.74$, and (b) a smaller percentage of negative words ($M=38.36$, $SD=16.88$) than the participants in the "high burnout" group ($M=48.95$, $SD=15.39$), Cohen's $d=0.66$. The effect of group membership on the percentage of recalled positive and negative words remained statistically significant when history of depressive disorders was introduced as a covariate (effect size reduced by 9%) but not when depressive symptoms were controlled for ($F(2, 670)=1.32$, $p=0.27$).

We found no effect of group membership on the number of mistakes ($p=0.08$), the percentage of mistakes ($p=0.56$), or the total word count ($p=0.91$).

Discussion

The main aim of this study ($N=1015$) was to examine burnout–depression overlap in terms of memory biases toward emotional information. As predicted, we found that burnout and depressive symptoms were associated with similar mnemonic alterations, consisting in an under-recall of positive items and an over-recall of negative items. This study (a) confirms that negative information outweighs positive information in depressed individuals' memory (Everaert et al., 2014; Gotlib and Joormann, 2010) and (b) highlights, for the first time, a similar phenomenon in burnout.

Burnout–depression overlap has been documented at a nomological network level in many studies. For instance, burnout and depression have been found to be similarly associated with rumination, neuroticism, extraversion, self-rated health, physical activity, job satisfaction, job adversity, workplace social support, and stressful life events (for an overview, see Bianchi et al., 2018). In Bianchi and Laurent's (2015) eye-tracking study, burnout and depression were related to the same tendency to over-focus on dysphoric information and to under-focus on positive information. The present study suggests that the burnout–depression overlap extends to emotional memory. The propensity of individuals with burnout/depressive symptoms to prioritize negative information is likely to play a role in symptom

maintenance by participating in a self-undermining spiral—the more dysphoria one experiences, the more negative memories one stabilizes, the more dysphoria one experiences, and so on (Gotlib and Joormann, 2010).

In our study, the overlap of burnout with depression was also reflected in the strong correlation between the two variables. Associations of similar magnitudes have been commonly found when correlating different measures of burnout or different measures of depression with each other (Bianchi and Brisson, 2017; Shirom and Melamed, 2006; Wojciechowski et al., 2000). Our results are in keeping with the view that burnout refers to depressive manifestations under a nonmedical label (Bianchi et al., 2018).

Interestingly, burnout and depressive symptoms were not associated with mistakes in the reported words, or with the overall number of recalled words. These findings contrast with those documented in some previous studies (for reviews, see Deligkaris et al., 2014; Rock et al., 2014). Our findings, however, are consistent with the idea that the impairment of executive functions in burnout and depression is primarily detectable in the most severe forms of these conditions (Deligkaris et al., 2014; Snyder, 2013). Although our sample contained individuals with varied levels of burnout and depressive symptoms, these symptoms were still compatible with the capacity to work and might not have been severe enough to influence immediate free recall performance.

At least four limitations to this study should be mentioned. First, because our study was cross-sectional, the issue of whether memory biases are better viewed as risk factors, correlates, or consequences of burnout and depression could not be addressed (Gotlib and Joormann, 2010). Second, about 9 of 10 participants in our study were women, a state of affairs that bears on the generalizability of our results to men. This being mentioned, sex showed no clear association with any of the variables under scrutiny, suggesting that this imbalance may not be of major importance. Third, only working individuals were examined in this study. Studies involving individuals on sick leave, who may present with more severe symptoms, would be useful. Fourth, only one type of memory test was employed in our study. It would be informative to employ different types of memory tests in the future (e.g. delayed recall tasks), in order to examine other facets of emotional memory in burnout versus depression.

All in all, our findings suggest that burnout and depression are associated with similar alterations of emotional memory. Our study provides additional evidence that individuals with burnout symptoms view the world with "depressive glasses," consistent with the idea that burnout is a depressive condition.

Declaration of Conflicting Interests

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Note

1. Positive terms in English: interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active; negative terms in English: distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, and afraid.

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