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Affective and cognitive symptoms associated with burnout in a general population: are there sex-related differences?

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ABSTRACT

Burnout is an increasing public health problem. Although research indicate that cognitive and affective factors are related to burnout, there is a lack of knowledge about the extent to which specific cognitive and affective symptoms are related to burnout, and whether there are sex-related differences. An aim of this study was to identify specific self-reported cognitive and affective symptoms that are particularly associated with burnout, both in the population in general and in men and women separately. Another aim was to examine the risk of burnout for specific symptoms and total number of symptoms in the general population and in men and women separately. Cross-sectional data were used from a large population-based questionnaire study consisting of 3406 participants (18–79 years) randomly selected from a general population in northern Sweden. Eleven cognitive and affective symptoms were assessed with a subsection of the Environmental Hypersensitivity Symptom Inventory, and the 22-item Shirom-Melamed Burnout Questionnaire (SMBQ) was used to assess burnout. The findings suggest that burnout is associated with a rather large number of cognitive and affective symptoms, in particular feeling tired/lethargic, having concentration difficulties, sleep disturbance, feeling depressed and being absent minded. Women with burnout (SMBQ score ≥ 4) reported higher prevalence of feeling tired/lethargic and sleep disturbance. The results add to the understanding of affective and cognitive symptomatology in burnout, which might have implications for early identification and prevention of burnout and exhaustion disorder.

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Introduction

Stress-related ill-health, such as burnout and exhaustion disorder (ED), is continuously increasing in western countries, generating significant costs for both individuals and organizations (Edú-Valsania et al., 2022; Hassard et al., 2018). Although there are various definitions and indicators of burnout symptoms, they typically revolve around one central aspect: exhaustion. Traditionally, burnout has been associated with work-related stress, as operationalized in the Maslach Burnout Inventory, which includes the dimensions of emotional exhaustion, cynicism, and reduced professional efficacy (Maslach et al., 2001). However, alternative theories suggest that prolonged stress, regardless of its source, can lead to burnout. The Conservation of Resources (COR) theory suggests that burnout, manifested by prolonged feelings of physical fatigue, emotional exhaustion and cognitive weariness, arises from the depletion of energetic resources due to cumulative exposure to chronic stressors both at and off work (Hobfoll et al., 2000; Melamed et al., 2006). Various self-report scales exist to measure burnout, with the Maslach Burnout Inventory (MBI) and the Shirom Melamed Burnout Questionnaire/Measure (SMBQ/M) being two of the most frequently used. Whereas the MBI focuses on work-related burnout, the SMBQ/M is based on the COR theory and assesses emotional, physiological and cognitive exhaustion related to general stressors in life. This conceptualization of burnout has proven valuable not only for assessing burnout in the general population (Norlund et al., 2010), but also in clinical settings (Glise et al., 2012), which is why the SMBQ/M, henceforth referred to as the SMBQ, was used as instrument for assessing burnout in the present study.

Although the burnout concept was not intended for clinical use, it is common that individuals seek

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medical care for severe stress-related symptoms of exhaustion. The medical and psychological nomenclature for exhaustion after a long period of severe stress differs between countries and disciplines (Nadon et al., 2022; van Dam, 2021). In the 11th revision of the International Classification of Diseases (ICD-11), burnout is included as an occupational phenomenon, defined as a syndrome resulting from chronic workplace stress that has not been successfully managed (World Health Organization (WHO), 2019). In Sweden, however, exhaustion disorder (ED; F43.8A) has been introduced in the Swedish version of ICD-10 (The National Board of Health and Welfare, 2003), in order to facilitate the diagnosis of 'clinical burnout', which is presumed to be caused by recurrent non-life-threatening stressors combined with a lack of recovery over a prolonged period of time. The diagnostic criteria include excessive and persistent fatigue, emotional distress and cognitive weariness related to long-term stress exposure (The National Board of Health and Welfare, 2003). While the burnout concept as described in the ICD-11 focuses on burnout as an organizational phenomenon, the definition of ED in the Swedish version of ICD-10 more closely resembles the components of the COR theory, in which life stressors are seen as precursors of burnout, regardless of whether they are work-related or not. The concept of ED share large similarities with internationally recognized concepts such as clinical burnout, chronic fatigue, stress-related exhaustion and job stress-related depression (Lindsäter et al., 2022; Wallensten et al., 2019).

Although the main symptom is exhaustion and reduced mental energy, other symptoms, such as cognitive, affective, and somatic symptoms as well as behavioral and motivational symptoms has been associated with burnout (Heinemann & Heinemann, 2017; Schaufeli & Enzmann, 1998) and exhaustion disorder (Lindsäter et al., 2023; Wallensten et al., 2019). Cognitive symptoms include problems with fatigue (Gavelin et al., 2020), concentration (Schaufeli & Enzmann, 1998), working memory, episodic memory, prospective memory as well as executive functions such as difficulty in decision making and reduced coping capacity (Eskildsen et al., 2016; Gavelin et al., 2022; Grossi et al., 2015; Lindsäter et al., 2022; Nelson et al., 2021). Research on cognitive symptoms among ED patients indicate cognitive impairment as measured by both subjective cognitive complaints and objective cognitive test performance (Malmberg Gavelin et al., 2022). However, there is not always a correspondence between subjective complaints and objective test performance. For example, Nelson et al. (2021) found that ED patients experienced cognitive symptoms. These symptoms were, however, not related to objective performance on cognitive tests.

Affective symptoms associated with burnout include e.g. anxiety, depression, dissatisfaction with life, low self-esteem, and irritability (Maroti et al., 2017; Maslach & Leiter, 2016; Salvagioni et al., 2017). Somatic symptoms associated with burnout include nausea, bowel irritation, headache, dizziness (Schaufeli & Enzmann, 1998) as well as insomnia and chronic fatigue (Brand et al., 2010; Giorgi et al., 2017). For example, Glise and coworkers found that 98% of ED patients reported that they felt tired and had low energy, and that 85% reported disturbed sleep (Glise et al., 2014). Experiencing pain and feeling faint are also associated with exhaustion (Ekstedt & Fagerberg, 2005; Glise et al., 2014). Hammarström et al. (2023) found that fatigue, pain and gastrointestinal symptoms were found to be particularly common in burnout, with a 2- to 9-fold increased risk when adjusted for anxiety and depression. In a recent exploratory study of patients with ED, Lindsäter et al. (2023) found six overarching categories of self-reported symptoms: physical symptoms, perception of self, mood and emotional symptoms, energy/fatigue, sleep and cognitive symptoms. In the category of mood and emotional symptoms, depressed mood, emotional regulation, anxiety and worry were reported. In the cognitive category, symptoms of general cognitive functioning, cloudiness of the brain, and perceived slowness of thoughts were reported. The occurrence of these cognitive, affective and somatic symptoms is part of the burnout process. The process, which starts with lack of recovery from physiological stress reactions, lead to chronically elevated stress levels (Geurts & Sonnentag, 2006), which, in turn, leads to somatic and psychological symptoms (van Dam, 2021). Initially, the signs and symptoms of burnout are subtle, with gradual progression and negative changes in the individual's psychological and physical functioning (Ekstedt & Fagerberg, 2005; Jingrot & Rosberg, 2008; Toker et al., 2012). For example, the results of a retrospective medical chart review showed that complaints of anxiety, depression as well as stress, pain, fatigue, gastrointestinal symptoms were related to exhaustion disorder diagnosis two years later (Adamsson & Bernhardsson, 2018).

Regarding sex and gender differences and burnout the literature has produced inconsistent findings (Purvanova & Muros, 2010), with some studies showing higher prevalence of burnout in women (Bakker et al., 2002; Höglund et al., 2020; Lindblom et al.,

2006; Norlund et al., 2010, Marchand et al., 2018), whereas other report higher prevalence in men (van Horn et al., 1997), or no differences (Glise et al., 2010; 2014). Whereas studies have identified symptoms that are associated with burnout and ED in general, there is much less documentation on whether these symptoms affect women differently than men. In a study of somatic and psychological symptoms preceding the development of burnout, no sex-differences were found (Adamsson & Bernhardsson, 2018). In another study, the prevalence of sleep-disturbance among men and women experiencing burnout was investigated. The results indicated that women reported higher degree of impaired awakening then men. There were, however, no sex-differences with respect to other aspects of sleep disturbance.

The high prevalence rates and the severe consequences that burnout has on the individual and society, emphasizes the need for more knowledge of symptoms associated with burnout. Sex-related differences in burnout and ED also calls for investigation of whether there are sex-differences in affective and cognitive symptoms related to burnout. In addition, the fact that self-reported symptoms not always correspond to objective performance highlights the importance of studying individuals' experiences of symptoms related to burnout.

The present study investigated the associations between self-reported cognitive and affective symptoms and burnout. More specifically, the aim was twofold. Firstly, to explore the prevalence of self-reported cognitive and affective symptoms and their association to burnout, in a general adult population as well as in women and men separately. Secondly, to estimate the risk of burnout for individual and total number of self-reported cognitive and affective symptoms, in general and for women and men separately. Based on previous findings, we expected a positive association between cognitive and affective symptoms and degree of burnout. Furthermore, we expected symptoms of exhaustion to be more prevalent among women than men.

Materials and methods

Participants

Cross-sectional data from the Västerbotten Environmental Health Study were used in the present study. Västerbotten has a demographically similar distribution to the general Swedish population in terms of age and sex (Palmquist et al., 2014). Initially, the survey was distributed to 8520 persons between the ages 18–79 years, randomly selected from the population in Västerbotten county in Sweden (see Table 1 for stratification). Of these, 3406 persons gave their consent to participate in the study and responded to the questionnaire. This corresponded to a response rate of 40.0%. The sample consisted of 55.7% women ($n = 1898$) and 44.3% men ($n = 1508$).

Table 1. Numbers of respondents (and percentage of those invited) across age and sex strata.

Age (years)	Women	Men
18–29	307 (32.1)	179 (17.3)
30–39	266 (40.3)	177 (24.7)
40–49	288 (40.5)	230 (31.0)
50–59	367 (50.9)	295 (39.5)
60–69	405 (58.4)	356 (50.7)
70–79	265 (53.8)	271 (63.9)
18–79	1898 (45.2)	1508 (34.9)

Procedure

The data collection was conducted in 2010, and the questionnaire was distributed via postal services including a prepaid response envelope. Also included in the questionnaire was information about the study, and consent was given as the participants replied. Non-responders received a first reminder after three weeks. A second reminder with a new copy of the questionnaire was sent out after an additional three weeks (Palmquist et al., 2014). The questionnaire consisted of background questions regarding demographic information and health-related questions, as well as a number of standardized questionnaires. The demographic questions included one question about participants' sex with two response options; woman or man. The study was conducted in accordance with the Helsinki Declaration and approved by the Umeå Regional Ethics Board (Dnr 09-171 M) and the Swedish Ethical Review Authority (Dnr 2022-05265-02). Participation in the study was strictly voluntary and all participants gave their informed consent.

Instruments

To measure burnout, the Swedish version of the Shirom-Melamed Burnout Questionnaire (SMBQ) was used (Almén & Jansson, 2021). The questionnaire consists of 22 items divided on four subscales: physical and emotional fatigue, cognitive weariness, tension, and listlessness. The questions are responded to on a seven-point scale ranging from almost never (1) to almost always (7). Higher scores on the scale indicate higher levels of burnout (Almén & Jansson,

2021). The participants meeting a cutoff of ≥4.0 (Glise et al., 2012) were considered as cases of burnout, and those below this cutoff were considered as referents. SMBQ has good construct validity and good internal consistency with a Cronbach's alpha of .90 (Almén & Jansson, 2021; Glise et al., 2012; Michel et al., 2022; Sundström et al., 2023). In addition, confirmatory factor analyses have indicated acceptable model fit for the 4-factor version of the SMBQ on a Swedish general population sample (Sundström et al., 2023).

Cognitive and affective symptoms (CAS) were assessed with the Environmental Hypersensitivity Symptom Inventory (EHSI), which is a questionnaire developed for measuring various symptoms of environmental intolerances. The EHSI is composed of five subscales of categories of symptoms; cognitive and affective symptoms, head-related and gastro-intestinal symptoms, airway symptoms, skin and eye symptoms, cardiac, dizziness and nausea symptoms. Participants were asked to report which symptoms they have had at least once a week during the last three months. Participants responded to the items on a dichotomous scale with the options yes or no (Nordin et al., 2013). The CAS sub-scale, used in the present study, consists of eleven items; memory difficulties, concentration difficulties, absent mindedness, general discomfort, feeling tired/lethargic, sleep disturbance, feeling tense/nervous, feeling irritable/edgy, feeling depressed, feeling worried and other cognitive or affective symptoms (exemplified in the questionnaire as 'lack of motivation'). The EHSI has good construct validity and internal consistency (KR-20=.85). The CAS subscale have also been found to have good levels of internal consistency (KR-20=.80) (S. Nordin et al., 2013). Sleep disturbance, anxiety and depression were assessed for a background description of the participants. Seven items from the Karolinska Sleep Questionnaire (KSQ) (M. Nordin et al., 2013) assessing sleep quality and non-restorative sleep was used to measure sleep disturbance. The participants are asked how often, during the last three months, they experienced different sleep-related problems. Questions are answered on a six-point scale ranging from (0) never to (5) always (5 times or more per week). Higher scores are interpreted as a higher level of perceived sleep disturbance, and a score above 2.99 indicate sleep disturbance. KSQ has good psychometric properties (M. Nordin et al., 2013). In the present study, sleep disturbance had an internal consistency as measured by Cronbach's alpha of .83.

The Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) is a questionnaire consisting of 14 items with two subscales of 7 items each, measuring anxiety (HADS-A) and depression (HADS-D), respectively. The questions are responded to on a scale of 0–3 points based on the frequency of subjectively experienced symptoms during the last week. The total score on each subscale can range from 0 to 21. A higher score indicates higher levels of perceived anxiety and/or depression. A total score of 8 or higher indicate elevated levels of anxiety/depression (Olssøn et al., 2005). The Swedish version of the HADS was used in the present study, which has been found to have adequate reliability and construct validity (Bjelland et al., 2002; Lisspers et al., 1997). In the present study, Cronbach's alpha was .85 for HADS-A and .83 for HADS-D.

In addition to these instruments, the questionnaire comprised of background questions about demographics, physical exercise, self-rated health, and self-reports of psychiatric diagnosis given by a physician (depression, burnout, panic disorder, generalized anxiety disorder, chronic fatigue syndrome, post-traumatic stress disorder and ADHD).

Statistical analysis

The fully conditional Markov Chain Monte Carlo method was used to handle potential problems regarding missing values in the data set. The missing values were imputed five times. In the original dataset, the percentage of missing values was 3.1% for the SMBQ items. For the CAS items there were no missing values. IBM SPSS statistics version 28.0.1 was used to perform statistical analyses. Normality checks were performed by inspection of absolute values of skewness and kurtosis following guidelines for sample sizes >300, proposed by Mishra et al. (2019), in which values of skewness ≤2 and kurtosis ≤4 can be used as reference values for considerable normality. The burnout case group (SMBQ total score ≥4.0) and reference group were compared using chi^2 analysis on categorical variables; background variables, self-rated health, self-reported diagnoses and independent samples t-test on continuous variables HADS-A and HADS-D and KSQ sleep disturbance, since the values of skewness and kurtosis indicated approximate normal distribution (Mishra et al., 2019).

Prevalence of CASs for the total sample and for men and women separately was calculated and differences in prevalence rate between the burnout and reference groups as well as between men and women in the burnout group were tested using chi^2 analyses. Post hoc tests with Bonferroni correction were used to examine which groups that differed

statistically significant in proportions. Effect size was calculated using Cramer's V (Kim, 2017) for which values of .10 are considered small, .30 as medium, and .50 and above as large in effect size when degrees of freedom =1. Moreover, eta^2 was used as a measure of effect size for analyses of variance, for which values of .04 are considered small, .25 moderate and .64 a strong effect (Ferguson, 2009). The distributions for the CAS items were positively skewed, and two of the items had skewness values >2. Therefore, non-parametric Spearman correlations were used to calculate the bivariate associations between degree of burnout (SMBQ score) and specific and total number of CAS. Strength of correlations were interpreted using the criteria suggested by Ferguson (2009), for which .20, .50 and .80 are considered a small, moderate and strong effect, respectively. Furthermore, intercorrelation between specific CASs were examined to rule out potential problems of multicollinearity between independent variables in regression analyses. The results showed no tendencies of multicollinearity, with correlations ranging between r=.16 and .45 (M=.30).

To investigate the risk of burnout when specific CASs were present, logistic regression analyses were performed for the total sample as well as for men and women separately. The analyses were performed using dichotomous variables for burnout (SMBQ) based on the clinical cut-off (SMBQ score ≥4.0). First, odds ratios were calculated for each CAS's unique predictive capacity of burnout, when all the other CAS were included in the model. To control for the effect of demographic variables, the variables age, gender, living with a partner, having children under the age of seven living at home and education level were adjusted for in the model as a second step. When investigating the risk of burnout for total number of CASs, a continuous scale of total score for the CAS-items was used. Both an unadjusted and an adjusted model was tested using the same demographic variables as for specific CASs.

Table 2. Participant characteristics in the burnout case and referent groups and the total sample.

	Case group (n = 620)	Referents (n = 2786)	Total (n = 3406)
Women, % (n)	67.1 (416)***	53.2 (1482)	55.7 (1898)
Age year, mean (SD)	48.82 (17.26)***	51.76 (16.71)	51.22 (16.85)
Married/living with partner, % (n)	67.9 (419)***	73.9 (2061)	72.8 (2480)
Children living at home <7 years, % (n)	15.7 (97)**	11.5 (320)	12.2 (417)
Children living at home 7–12 years, % (n)	11.3 (70)^{ns}	9.8 (270)	10.0 (335)
Children living at home 13–17 years, % (n)	13.3 (82)^{ns}	11.3 (316)	11.7 (398)
University education, % (n)	39.3 (241)^{ns}	41.8 (1164)	41.3 (1405)
Physical exercise ≥ 2 times/week, % (n)	57.5 (347)***	68.5 (1908)	66.2 (2255)
Self-rated health, % (n)			
Excellent	3.0 (18)*	12.3 (339)	10.6 (357)
Very good	14.0 (85)*	32.9 (907)	29.4 (992)
Good	31.3 (190)^{ns}	34.8 (962)	34.2 (1152)
Fairly good	39.8 (242)*	18.5 (512)	22.4 (754)
Poor	12.0 (73)*	1.5 (41)	3.4 (114)
HADS-A, mean (SD)	8.66 (4.20)***	3.57 (2.92)	4.46 (3.74)
HADS-D, mean (SD)	6.73 (3.97)***	2.36 (2.27)	3.13 (3.14)
PSS-10, (mean, SD)	21.01 (5.74)***	12.30 (5.14)	13.89 (6.24)
PHQ-15 percent (mean, SD)	35.36 (16.82)***	18.47 (13.84)	21.54 (15.83)
KSQ Sleep disturbance, mean (SD)	2.37 (.96)***	1.35 (0.76)	1.53 (.89)
Diagnosis[1], % (n)			
Depression	17.9 (111)***	2.1 (59)	5.0 (170)
Exhaustion disorder	11.9 (74)***	2.5 (70)	4.2 (144)
Panic disorder	4.8 (30)***	0.7 (20)	1.4 (50)
Generalized anxiety disorder	3.9 (24)***	0.3 (8)	1.0 (32)
Chronic fatigue syndrome	1.8 (11)***	0.4 (12)	0.7 (23)
Posttraumatic stress disorder	2.4 (15)***	0.4 (12)	0.8 (27)
Attention-deficit/ hyperactivity disorder	1.8 (11)***	0.2 (6)	0.5 (17)

Results are given from tests of differences in means and proportions between case and reference groups.
Note: *p < .05, **p < .01, ***p < .001, ^{ns}non-significant; HADS = Hospital Anxiety (A) and Depression (D) Scale.
Group comparisons were performed with t-test for age and HADS, PSS-10, PHQ-15 and Poor sleep quality score and with chi-square analyses for the remaining variables.
[1]Self-reports of diagnosis given by a physician.

Results

Study sample

There were 620 (18.2%) individuals in the sample who met the cut-off for burnout, referred to as the case group, and 2786 (81.8%) did not meet the cut-off, referred to as referents. Differences between the two groups were found on numerous background variables presented in Table 2. In addition, we examined whether there were sex-related differences in the case and reference groups with respect to these background variables (see Table 3). The only significant differences found between men and women in the case group were that women reported higher frequency of physical activity, and men reported higher levels of depression (HADS-D (M = 7.31, SD = 4.13) compared to women (M = 6.45, SD = 3.86), F(3,3343)=488.15, p<.05. Due to the larger sample in the reference group, significant differences were found between men and women on several variables; age, proportion married/living with partner,

Table 3. Participant characteristics in the groups at risk for burnout, their referent groups for men and women separately.

	Case group (n = 620)		Referents (n = 2786)			
	Men (MC)	Women (WC)	Men (MR)	Women (WR)	Post hoc comparisons ($p<.05$)	Effect size
Age year, mean (SD)	51.1 (17.5)	47.7 (17.0)	53.2 (16.3)	50.5 (17.0)	MC = MR > WR > WC	.01
Married/living with partner, % (n)	67.3 (136)	68.2 (283)	75.8 (981)	73.6(1080)	MC = WC = WR < MR	.06
Children living at home <7 years, % (n)	15.8 (32)	15.7 (65)	9.9 (128)	13.1 (192)	MC = WC = WR > MR	.07
Children living at home 7–12 years, % (n)	8.9 (18)	12.5 (52)	9.0 (117)	10.4 (153)	MC = WC = MR = WR	–
Children living at home 13–17 years, % (n)	9.4 (19)	15.2 (63)	10.9 (141)	11.9 (175)	MC = WC = MR = WR	–
University education, % (n)	33.3 (67)	42.2 (174)	35.2 (454)	48.6 (710)	WR > WC = MR = MC	.13
Physical exercise ≥ 2 times/week, % (n)	47.0 (93)	62.6 (254)	63.3 (817)	74.4 (1091)	WR > WC = MR > MC	.16
Self-rated health, % (n)						.20
Excellent	2.5 (5)	3.2 (13)	12.9 (167)	11.7 (172)	MC = WC < MR = WR	
Very good	11.4 (23)	15.2 (62)	29.5 (382)	35.8 (525)	MC = WC < MR < WR	
Good	33.3 (67)	30.2 (123)	36.9 (478)	33.0 (484)	MC = WC = MR = WR	
Fairly good	38.8 (78)	40.3 (164)	19.0 (246)	18.1 (266)	MC = WC > MR = WR	
Poor	13.9 (28)	11.1 (45)	1.6 (21)	1.4 (20)	MC = WC > MR = WR	
HADS-A, mean (SD)	8.44 (4.30)	8.77 (4.14)	3.17 (2.72)	3.91 (3.03)	MC = WC > WR > MR	.28
HADS-D, mean (SD)	7.31 (4.13)	6.45 (3.86)	2.55 (2.34)	2.19 (2.18)	MC > WC > MR > WR	.29
PSS-10, (mean, SD)	20.44 (5.88)	21.29 (5.66)	12.00 (4.93)	12.57 (5.31)	MC = WC > WR > MR	.29
PHQ-15 (mean, SD)	34.87 (17.94)	35.59 (16.26)	16.11 (13.20)	20.54 (14.07)	MC = WC > WR > MR	.19
KSQ Sleep disturbance, mean (SD)	2.39 (0.97)	2.36 (0.96)	1.24 (0.73)	1.44 (0.78)	MC = WC > WR > MR	.21
Diagnosis[1], % (n)						
Depression	15.7 (32)	19.0 (79)	1.0 (13)	3.1 (46)	MC = WC > MR = WR	.29
Exhaustion syndrome	9.3 (19)	13.2 (55)	1.2 (16)	3.6 (54)	MC = WC > WR > MR	.19
Panic disorder	4.9 (10)	4.8 (20)	0.3 (4)	1.1 (16)	MC = WC > MR = WR	.14
Generalized anxiety disorder	2.5 (5)	4.6 (19)	0.3 (4)	0.3 (4)	MC = WC > MR = WR	.15
Chronic fatigue syndrome	2.0 (4)	1.7 (7)	0.5 (7)	0.3 (5)	MC = WC > MR = WR	.07
Posttraumatic stress disorder	1.0 (2)	3.1 (13)	0.2 (2)	0.7 (10)	MC = WC > MR = WR	.10
Attention-deficit/hyperactivity disorder	2.9 (6)	1.2 (5)	0.2 (2)	0.3 (4)	MC = WC = WR > MR	.10

Tests of mean differences and proportions were performed between case-group and reference group.
Note: [1]Self-reports of diagnoses given by a physician.

university education, physical exercise, PHQ-15 somatic symptoms, PSS-10, HADS-A, HADS-D, poor sleep quality as well as self-reported diagnosis of burnout and ADHD. However, the effect size for several of these differences were small (see Table 3).

Symptom prevalence

The mean number of CASs and the prevalence rate for specific CASs in the case and reference groups, including all participants in those groups, are displayed in Table 4. The case group experienced significantly more symptoms than the reference group. In addition, the prevalence rates for all specific symptoms were higher in the case group compared to the reference group. The most prevalent symptoms in the case group were feeling tired/lethargic, concentration difficulties, absent minded, sleep disturbance and feeling depressed (≥48.3%).

Women in the case group reported more symptoms on average compared to men in the case group (see Table 4). The table also shows sex-related differences in rates for specific symptoms as well as results from post-hoc comparisons. There were differences in prevalence between men and women for the symptoms feeling tired/lethargic and sleep disturbance. Feeling tired/lethargic was reported by 80.3% of the women and 66.2% of the men in the case group. Sleep disturbance was reported by 50.0% of the women and 36.3% of the men in the case groups. For both men and women feeling tired/lethargic was the most prevalent symptom, followed by concentration difficulties and absent mindedness (see Table 4).

Associations between burnout and cognitive and affective symptoms

A strong positive correlation was found between total number of CASs and burnout score. Positive correlations of moderate strength were found between burnout score and all specific CASs. The same pattern was observed in the total sample as for men and women separately (see Table 5). For both women and men, the symptom 'feeling tired/lethargic' was strongest associated with burnout score.

Results from the logistic regression analyses are given in Table 6 and show that in the unadjusted model significant predictors of burnout were memory difficulties, concentration difficulties, absent mindedness, feeling tired/lethargic, sleep disturbance, feeling irritable/edgy, feeling depressed, feeling worried and other cognitive or affective symptoms, ($\chi^2(11)=810.77$, $p<.001$, (Nagelkerke $r^2=.345$). In this model 35% of the variance in

Table 4. Mean number of affective and symptoms and prevalence rates for specific symptoms in the case and reference groups for the total sample, and men and women separately.

	Women		Men			Total sample			
	Case group (WC) (n = 416)	Referents (WR) (n = 1482)	Case group (n = 204) (MC)	Referents (MR) (n = 1304)	Post hoc comparisons	Case group (n = 620)	Referents (n = 2786)	Total (n = 3406)	Effect size Eta2 Cramer's V
Number of CASs, mean (SD)	4.93 (3.19)	1.59 (1.81)	3.96 (2.99)	1.11 (1.57)	**WC > MC > WR > MR**	4.61 (3.16)	1.36 (1.72)	1.96 (2.42)	.29
Memory difficulties % (n)	41.6 (173)	9.0 (134)	32.8 (67)	12.1 (158)	WC = MC > WR = MR	38.7 (240)	10.4 (292)	15.6 (532)	.31
Concentration difficulties % (n)	49.8 (207)	10.4 (154)	38.7 (79)	8.2 (107)	WC = MC > WR = MR	46.1 (286)	9.4 (261)	16.1 (547)	.40
Absent minded % (n)	48.3 (201)	15.7 (232)	38.7 (79)	11.7 (152)	WC = MC > WR > MR	45.2 (280)	13.8 (384)	19.5 (664)	.31
General discomfort % (n)	20.9 (87)	3.5 (52)	15.7 (32)	2.5 (33)	WC = MC > WR = MR	19.2 (119)	3.0 (85)	6.0 (204)	.27
Feeling tired/lethargic % (n)	80.3 (334)	41.0 (607)	66.2 (135)	27.4 (357)	**WC > MC > WR > MR**	75.6 (469)	34.6 (964)	42.1 (1433)	.33
Sleep disturbance % (n)	50.0 (208)	26.2 (389)	36.3 (74)	17.4 (227)	**WC > MC > WR > MR**	45.5 (282)	22.1 (616)	26.3 (898)	.21
Feeling tense/nervous % (n)	30.8 (128)	8.9 (132)	23.0 (47)	3.5 (45)	WC = MC > WR > MR	28.2 (175)	6.1 (165)	10.0 (340)	.29
Feeling irritable/edgy % (n)	41.3 (172)	14.4 (214)	35.3 (72)	9.5 (124)	WC = MC > WR > MR	39.4 (244)	12.1 (338)	17.1 (582)	.29
Feeling depressed % (n)	48.3 (201)	11.7 (173)	38.7 (79)	7.4 (96)	WC = MC > WR > MR	45.2 (280)	9.7 (269)	16.1 (549)	.38
Feeling worried % (n)	44.2 (184)	15.0 (223)	38.7 (79)	9.4 (123)	WC = MC > WR > MR	42.4 (263)	12.4 (346)	17.9 (609)	.31
Other cognitive or affective symptoms % (n)	37.3 (155)	7.8 (115)	31.9 (65)	6.6 (86)	WC = MC > WR = MR	35.5 (220)	7.2 (201)	12.4 (421)	.34

Group comparisons were performed with t-test for number of symptoms and chi-square analyses for prevalence rates. All case vs reference group differences were statistically significant ($p<.001$). Results are also given for post-hoc comparisons.
Note: Measures of effect size was eta^2 for ANOVA and Cramer's V for chi^2 analyses.

Table 5. Spearman correlation coefficients between burnout score (SMBQ) and total number of cognitive and affective symptoms (CASs) and mean score for each specific CAS for men, women and total sample.

	Burnout score		
	Women	Men	Total
Number of CASs	.637**	.559**	.608***
Memory difficulties	.372**	.275**	.327***
Concentration difficulties	.447**	.346**	.410***
Absent minded	.364**	.292**	.341***
General discomfort	.299**	.216**	.269***
Feeling tired/lethargic	.492**	.450**	.482***
Sleep disturbance	.266**	.259**	.270***
Feeling tense/nervous	.320**	.250**	.301***
Feeling irritable/edgy	.338**	.282**	.322***
Feeling depressed	.436**	.352**	.408***
Feeling worried	.354**	.282**	.333***
Other cognitive or affective symptoms	.377**	.284**	.343***

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

burnout was explained by the CAS. In the adjusted model, significant predictors were memory difficulties, concentration difficulties, absent mindedness, feeling tired/lethargic, feeling irritable/edgy, feeling depressed, and other cognitive or affective symptoms. In the adjusted model, $\chi^2(15)=837.70$, p<.001, (Nagelkerke $r^2=.360$) 36% of the variance in burnout was explained by the independent variables, including control variables. The predictors that contributed the most were feeling depressed, concentration difficulties and feeling tired/lethargic (see Table 6).

Regarding sex differences, the unadjusted model yielded significant results for both women $\chi^2(11)=528.33$, p<.001, (Nagelkerke $r^2=.373$) and men $\chi^2(11)=256.05$, p<.001, (Nagelkerke $r^2=.285$). In the adjusted model, the pattern of significant predictors was similar for men and women, except that memory difficulties was a significant predictor of burnout for women, but not for men, and that feeling worried was a significant predictor for men, but not for women. For women, 39% of the variance in burnout was explained by the independent variables, including control variables $\chi^2(14)=542.29$, p<.001, (Nagelkerke $r^2=.387$). The corresponding figure for men was 30% ($\chi^2(14)=265.44$, p<.001, (Nagelkerke $r^2=.299$).

The predictive capacity of number of CAS was also examined. An adjusted logistic regression analysis, using the same control variables as in previous analysis (Table 6), rendered a significant model, $\chi2(5)=791.80$, $p < .001$, (Nagelkerke $r^2=.343$), for which 34.3% of the variance in burnout was explained by the total number of CASs. The odds ratio for increased risk of burnout for each additional number of CAS was 1.68 in the model. Regarding sex differences, there was a similar pattern for women and men. For women, 36% of the variance in burnout was explained by number of CAS including control variables $\chi2(4)=501.49$, p<.001,

Table 6. Unadjusted and adjusted odds ratios (ORs), confidence intervals (CIs) and p-values for unique predictability of each affective and cognitive symptoms for risk of being present in the burnout case group (SMBQ ≥ 4.0) for the total sample and for men and women separately.

	Unadjusted						Adjusted					
	Women		Men		Total sample		Women		Men		Total sample	
	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI
Memory difficulties	2.36***	1.68–3.29	1.30 ns	.83–2.04	1.84***	1.41–2.40	2.15***	1.53–3.04	1.18 ns	.73–1.87	1.72***	1.30–2.26
Concentration difficulties	2.32***	1.67–3.22	1.94**	1.22–3.06	2.20***	1.69–2.87	2.38***	1.70–3.32	2.03**	1.28–3.24	2.27***	1.73–2.97
Absent minded	1.57**	1.16–2.13	1.56*	1.01–2.39	1.57***	1.23–2.01	1.75***	1.28–2.40	1.67*	1.07–2.59	1.71***	1.32–2.20
General discomfort	.93 ns	.55–1.56	.77 ns	.37–1.61	.89 ns	.59–1.35	.96 ns	0.57–1.64	.78 ns	.37–1.65	0.92 ns	.60–1.42
Feeling tired/ lethargic	2.33***	1.72–3.15	2.19***	1.51–3.18	2.33***	1.85–2.94	2.51***	1.84–3.43	2.30***	1.57–3.37	2.41***	1.90–3.07
Sleep disturbance	1.26 ns	.95–1.66	1.24 ns	.84–1.82	1.29*	1.03–1.61	1.19 ns	.89–1.58	1.15 ns	.78–1.70	1.19 ns	.95–1.49
Feeling tense/ nervous	1.03 ns	.70–1.53	1.65 ns	.91–.01	1.18 ns	.85–1.64	1.10 ns	.74–1.66	1.68 ns	.90–3.13	1.21 ns	.86–1.69
Feeling irritable/ edgy	1.21 ns	.88–1.67	1.44 ns	.93–2.22	1.28*	.99–1.67	1.22 ns	.88–1.70	1.49 ns	.95–2.32	1.30*	1.00–1.69
Feeling depressed	2.29***	1.65–3.17	2.32***	1.48–3.64	2.32***	1.78–3.01	2.36***	1.69–3.29	2.39***	1.51–3.78	2.37***	1.82–3.10
Feeling worried	1.32 ns	.94–1.85	1.73*	1.11–2.70	1.45**	1.11–1.90	1.33 ns	.94–1.86	1.78*	1.14–2.81	1.47**	1.13–1.93
Other cognitive or affective symptoms	2.02***	1.41–2.87	1.87**	1.16–3.00	1.96***	1.48–2.60	2.08***	1.45–2.98	1.94**	1.19–3.14	2.04***	1.53–2.71

Note: *$p < .05$, **$p < .01$, ***$p < .001$, nsnon-significant.

(Nagelkerke r^2=.361). The corresponding number for men was 28% ($\chi 2(14)$=250.85, p<.001, (Nagelkerke r^2=.284). The odds ratio for women was 1.69 (95% CI = 1.59–1.78) and for men 1.67 (95% CI = 1.55–1.80).

Discussion

The objectives of the present study were to explore the prevalence of self-reported cognitive and affective symptoms in burnout and estimate the risk of burnout when experiencing these symptoms in a general adult population. Although the association between emotional and cognitive factors and burnout has been established in previous research, the relationship between burnout and *specific* symptoms has been considerably less documented, especially in the general population. Better understanding is also needed regarding sex-related differences in these symptoms in burnout.

Although previous research has shown that various symptoms are associated with burnout (Schaufeli & Enzmann, 1998) and ED (see e.g. Lindsäter et al., 2023), the present study provide additional information of the prevalence of self-reported cognitive and affective symptoms in an adult general population. The burnout group had on average a considerable higher number of self-reported CAS, and the prevalence was significantly higher in the burnout case group compared to the reference group for all specific symptoms. The most prevalent symptoms were feeling tired/lethargic, concentration difficulties, sleep disturbance, feeling depressed, and absent mindedness. The least common symptom was general discomfort. This is in line with previous literature, showing that affective symptoms and disorders such as depression and anxiety (Koutsimani et al., 2019) and impairments in cognitive functioning such as executive functions and cognitive coping are related to burnout (Deligkaris et al., 2014; Gavelin et al., 2022; Lindsäter et al., 2022). Providing more specific information, the findings from the present study indicated that each of the symptoms experiencing memory difficulties, concentration difficulties, being absent minded, feeling tired/lethargic, feeling irritable/edgy, feeling depressed, feeling worried and other cognitive and affective symptoms individually increased the risk of having burnout. Together, these cognitive and affective symptoms explained 34% of the variation in burnout. Concentration difficulties, feeling depressed and feeling tired/lethargic were the symptoms found to be strongest associated with being at risk of burnout. These findings are also in concordance with previous research on ED patients, showing that feeling tired and having sleep disturbances are reported by the majority of these patients (Glise et al., 2014), and that symptoms of depression are associated with exhaustion (Adamsson & Bernhardsson, 2018; Lindsäter et al., 2022). The results also showed that with each additional symptom the risk of burnout increased by a factor 1.68, when

controlling for background variables. This implies that if having five symptoms (which was the average number of symptoms in the burnout group), there is a 13-fold increased risk of burnout. Thus, the burden of experiencing multiple CASs appears to be strongly associated with a high risk of burnout. In general, the results from the present study contribute to the knowledge of the symptomatology underlying exhaustion-related disorders and might add to the understanding of the nature of the burnout condition. For a long time, there has been a discussion of whether burnout and depression are separate constructs, but emerging evidence provide support for the fact that burnout and depression are different, robust constructs (Koutsimani et al., 2019; Maslach & Leiter, 2016; Meier & Kim, 2022). The findings from the present study highlights that experiencing cognitive and affective symptoms seems to be important to consider when assessing patients with burnout symptoms. This knowledge might also be helpful in identifying early signs of exhaustion.

Few previous studies have covered sex-related differences regarding the prevalence of affective and cognitive symptoms among individuals suffering from burnout. These studies either indicated no differences (Adamsson & Bernhardsson, 2018) or differences related to sleep disturbance (Canazei et al., 2018; Stenlund et al., 2007). The results of the present study, however, indicate that women with burnout experience significantly more affective and cognitive symptoms than men with burnout. These findings are in line with studies on somatic symptoms, reporting that women experience more symptoms than men (Hammarström et al., 2023; Ihlebæk et al., 2002; Petrie et al., 2014). The symptoms of feeling tired/lethargic and sleep disturbance were, compared to the other groups, particularly common in women with burnout. This is in line with findings of Canazei et al. (2018) who found that women with burnout reported more emotional exhaustion, sleepiness and reduced vitality compared to men. Regarding cognitive and affective symptoms as predictors of risk of burnout, separate analyses for men and women showed similar pattern of predictors as for the total sample, with two exceptions. Firstly, the symptom memory difficulties was a significant predictor of burnout for women but not for men and, secondly, the symptom feeling worried was a significant predictor for men, but not for women. Previous research on sex-related differences in burnout has shown that women tend to report higher degree of exhaustion whereas men report higher degree of depersonalization, which indicates that prevalence of burnout among men and women are related to the aspects of burnout covered by the assessments (Purvanova & Muros, 2010). From this perspective, it is important that symptoms of burnout for men and women are represented in the assessments. For example, the SMBQ has a focus on exhaustion (emotional, physical and cognitive), whereas emotional aspects related to burnout, such as worry and depression, are not covered by the assessment. As burnout is a complex phenomenon, it has been proposed that tools should be designed that consider both the antecedents and physical and psychological consequences of burnout, providing a more global vision of the burnout syndrome (Edú-Valsania et al., 2022). The results from the present study can contribute to such work. The cognitive and affective symptom subscale of the EHSI used in this study contains symptoms of significance for burnout, e.g. memory difficulties, depression, irritability, and worry, that the SMBQ do not include. Worth to mention in this context is that a suggestion of including similar aspects in the assessment of burnout has recently been proposed by Schaufeli et al. (2020) in the development of the Burnout Assessment Tool, which comprises the dimensions of exhaustion, mental distance and cognitive as well as emotional impairment. The latter subscale focuses on difficulties in emotional regulation and includes items referring to getting upset, sad and irritable. The Burnout Assessment Tool is, however, focused on burnout in a workplace context, and there might thus be an additional need for a more general instrument suitable for the non-working population that covers these aspects.

The present study has both strength and limitations. The strengths include the large, population-based sample, stratified for age and sex, with an age and sex distribution that is very similar to that of Sweden in general, which enhances the generalizability of the results. With respect to limitations, the response rate of 40% might have resulted in a selection bias, although effects of low response rate have been shown vary little with response rates of 30–70% (Galea & Tracy, 2007). There is a risk that individuals suffering from burnout might have been less likely to participate in an extensive survey as the Västerbotten Environmental Health Study due to their exhaustion-related problems. If this is the case, the actual prevalence of CASs and burnout in the Swedish population may therefore be higher than reported in this study. As would be expected however, the burnout case group differed significantly from the reference group with respect to demographic and health-related variables. Women reported

in general higher levels of burnout than did men. Having children under the age of seven living at home as well as living without a partner was also more common for those high on burnout. The burnout group was also less engaged in physical activity, and more likely rated their health as 'fairly good/poor'. In addition, the burnout group scored higher on measures of depression, anxiety, and sleep disturbance, and the prevalence of lifetime psychiatric diagnoses was higher. This corresponds to previous findings regarding psychiatric comorbidity with the condition (Glise et al., 2014; Maroti et al., 2017; Rössler et al., 2015). Another limitation is that data was collected in 2010, which limits the generalizability of today's prevalence of mental-ill-health. However, the main focus of the present study is on associations between cognitive and affective symptoms and burnout, which we believe is not likely to have changed significantly in these years. The findings from the present study indicate that affective and cognitive symptoms are positively related to burnout, and that there is a high prevalence of these symptoms among individuals with burnout. However, as the present study was based on cross-sectional data, there is no possibility to evaluate the direction of these relationships. Moreover, common method variance due to the self-report format, might also have inflated these relationships. To examine whether cognitive and affective symptoms constitute risk factors for developing burnout or exhaustion disorder, longitudinal studies are needed. In these studies, it would also be interesting to examine whether the total burden of symptoms can predict the development of burnout. Future studies could also further investigate potential sex-related differences in CAS as predictors of burnout. Such studies should include non-binary persons as well.

Conclusion

In conclusion, the findings suggest that burnout is associated with a rather large number of cognitive and affective symptoms, in particular feeling tired/lethargic, having concentration difficulties, sleep disturbance, feeling depressed and being absent minded. Women with burnout are in general experiencing more symptoms than men, and they also report a higher prevalence of feeling tired/lethargic and having sleep disturbance. Cognitive and affective symptoms are associated with being at risk for burnout. The strongest associations were observed for the symptoms feeling depressed, concentration difficulties, and feeling tired/lethargic. Memory difficulties had a significant association with burnout for women, but not for men, and feeling worried had a significant association to burnout for men, but not for women, which indicates the importance of covering aspects related to burnout both in men and women in the assessment instruments.

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Authors' contributions

AS and SN conceptualized and designed the study. SN contributed to data acquisition. AS and SN planned the statistical analyses, and they were carried out by AS, EL and JN. AS, EL and JN drafted the manuscript preparation, and all authors contributed to interpretation and critically revising the manuscript for important intellectual content. All authors have read and approved this final version and are guarantors.

Disclosure statement

The authors report there are no competing interests to declare.

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Data availability statement

Data is available upon reasonable request.

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