

Association between script concordance test scores and burnout.

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Abstract

Introduction: The emotional state of the clinician affects the clinical reasoning process. Burnout results from excessive emotional demands in the workplace. Caregivers suffering from burnout show a state of emotional exhaustion leading them to distance themselves from their patients and to a reduction in their work efficacy. Our theoretical hypothesis is that burnout could alter clinical reasoning. There are few publications dealing with this issue and new data is needed to better understand how burnout might affect clinical reasoning. We chose to investigate the link between burnout scores and the results of a script concordance test (SCT).

Methodology: We conducted a cross-sectional observational study in a population of interns in general practice during their last semester. The burnout questionnaire (Maslach burnout inventory for human services survey) was undertaken immediately after the SCT examination. The quantitative data collected has been statistically analyzed.

Results: In September 2017, 139 students were invited, 128 attended and 111 were included. Among the participants, 71 didn't suffer from burnout, 19 experienced a mild burnout level, 19 a moderate burnout level and 2 a severe burnout level. No significant association with the SCT results ($p=0.7936$) was found.

Discussion: The absence of significant SCT variation dependent on burnout level can be explained by the fact that SCT examines the analytical dimension of the clinical reasoning process, whereas emotions are conventionally associated with the intuitive dimension. More research is needed to understand how burnout impacts clinical reasoning, especially time and cognitive load criteria.

Introduction

Herbert J. Freudenberger defined burnout as "becoming exhausted by making excessive demands on [...] resources" (1). It has three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment (2,3). The Maslach burnout inventory (MBI) is a validated questionnaire measuring the three dimensions of burnout (4).

Burnout seems to alter many cognitive functions such as alertness, working memory updating and cognitive control (5). It seems widespread among interns: from 27 to 75% depending on their medical specialty (6–8). There are many questions about the way burnout impacts the clinical reasoning process in this population (8–11).

Clinical reasoning is the cognitive processes necessary to evaluate and treat patients health problems (12). The main current theoretical model assumes the existence of a dual process. Non-analytical (system 1) and analytical (system 2) mechanisms are thought to act together to generate diagnostic hypotheses and select the most relevant one (13,14). Chronologically, different stages can be distinguished in the clinical reasoning process: hypothesis generation, selection, and diagnosis finalization (15). Difficulties in reasoning can occur at each one of those stages: difficulties in

generating hypotheses, premature diagnostic closure, difficulties in seeing the overall clinical situation (15).

Evaluation of the clinical reasoning process is a complicated task requiring authentic assessment tools (16). The script concordance test (SCT) is currently one of the most powerful tools available to assess clinical reasoning (16,17). It examines the stage of hypothesis selection in the clinical reasoning process (18). The SCT is one of the examinations that students in general medicine must pass to graduate at the Faculty of Medicine of the University of Strasbourg (France).

To better understand the link between clinical reasoning and burnout, we carried out a study looking for an association between MBI and SCT scores in a population of interns in general practice.

Methodology

We designed a cross-sectional observational study looking for a statistical association between the scores of a French version of the MBI and a SCT.

Context

SCTs have been used over the past decade at the Faculty of Medicine of the University of Strasbourg to graduate future general practitioners. Students benefit from a specific SCT training. They cannot register for SCT before the final year of training. We simultaneously gave the participants a presentation of the study, a written consent form and the French version of the MBI-HSS questionnaire. We orally informed the students of the research goal and the voluntary nature of their participation before the start of the examination. The SCT examination lasted 90 minutes and the students had to stay until the end.

Population

In September 2017, we chose to study the whole class of students in general practice applying for an SCT certification exam at the Faculty of Medicine of the University of Strasbourg. To be included, students had to register for the 2017 examination and complete the consent form.

Variables under consideration

We collected information about sex, age, marital and parental status, type (ambulatory or hospital) and specialty of residency.

The criteria selected to estimate the burnout are the MBI-HSS scores in each of its three dimensions: a 9-item emotional exhaustion scale, a 5-item depersonalization scale, and an 8-item personal accomplishment scale. Each item scores from 0 to 6 on a Likert frequency scale: 0 = never, 1 = at least a few times a year, 2 = at least once a month, 3 = a few times a month, 4 = once a week, 5 = a few times a week and 6 = every day. The burnout severity cut-offs originate from the original standards revised in this French population (2,4,7,19,20). Burnout is measured by the number of highly-affected dimensions: it is low if the score is high in one dimension (except for reduced personal accomplishment), moderate if the score is high in two dimensions and high if the score is high in all dimensions. The scores are detailed in table 1.

Table 1 MBI-HSS burnout dimensions cut-offs

Burnout dimensions scores	Emotional exhaustion	Depersonalization	Personal accomplishment
Low	0-17	0-5	40 or more
Moderate	18-29	6-11	34-39
High	30 or more	12 or more	33 or less

We analyzed the overall burnout level using the MBI-HSS questionnaire and the detailed scores in each dimension.

The criterion selected to estimate clinical reasoning was the SCT score. The test included 90 questions covering the categories of situation referred to in the frame of reference for general practice (21). The scores were expressed in percent for the analysis. The SCT was produced according to current quality standards (17,22). A score above or equal to 60/100 was required to pass the test.

Potential bias

The use of a standardized and validated burnout questionnaire given to the whole study population has reduced the subjectivity bias. The oral and written study presentation included no hypothesis but a large research question so as not to influence the answers of participants to the MBI questionnaire.

Statistical analysis

We used the R software provided by the methodology unit in clinical research of the Strasbourg University Hospital (GMRC) and its shiny-stat© application. A statistical descriptive analysis of the sample was conducted. Means were presented in the results with the 95% confidence intervals and the standard deviation or the minimum and maximum values.

The mean SCT scores were compared for qualitative variables of sex, marital and parental status using the Mann & Whitney test. We studied the statistical correlations between the SCT results and the quantitative age variables and the different MBI scores for each burnout dimension, by calculating the Pearson correlation coefficients (Rho). Finally, we compared the means of the SCT score in the subgroups classified according to burnout severity using the Kruskal-Wallis test.

Regulatory formalities and ethical advice

A declaration was registered to the CNIL (French National Commission on Informatics and Liberty) on 20 December 2016 under n°201186v0.

A favourable opinion was given by the ethical committee of the Faculty of Medicine and Dentistry, the Schools of Nursing, Physiotherapy and Maieutics, and the Strasbourg University Hospital. Participants to the study could realize that they suffered from burnout and thus received the contact details of a therapist and the people in charge of the study.

Funding

None.

Conflict of interest

The authors had no conflict of interest in this study.

Results

Population

139 students in total were invited to the SCT examination. 111 of the 128 students present participated (87.71%). Two thirds of the participants were women (66.6%). Most of the participants were in a relationship (81.6%) and had no children (83.1%). The average age of participants was 28.15 [min-max: 26-42] and the standard deviation was 1.61 year.

Most of the subjects were in their last semester of residency, 26 (26.53%) in an outpatient internship in general practice and 67 (68.37%) in a hospital. 5 (5.10%) had a non-active status.

Descriptive data

The mean SCT score was 76.16 (95% CI: 65.89-83.58) and the standard deviation was 4.81. The minimum score was 59.90 and the maximum score was 84.56.

The average SCT scores were similar for sex (76.61 vs 75.80; $p=0.3094$), marital (76.98 vs 75.98; $p=0.3837$) and parental (77.45 vs 76.52; $p=0.4059$) status and without significant correlation with age ($p=0.1153$).

All the participants filled in the MBI questionnaire. 71 students (63.96%) had no burnout, 19 (17.12%) a mild burnout level, 19 (17.12%) a moderate burnout level and 2 (1.80%) a severe burnout level. Regarding the emotional exhaustion dimension, 52 subjects (46.84%) had a low score, 37 (33.33%) a moderate score and 22 (19.82%) had a high score. Concerning the personal accomplishment dimension, 47 subjects (42.34%) had a low score, 40 (36.04%) a moderate score and 24 (21.62%) a high score. Table 2 illustrates the burnout dimensions means in our study population.

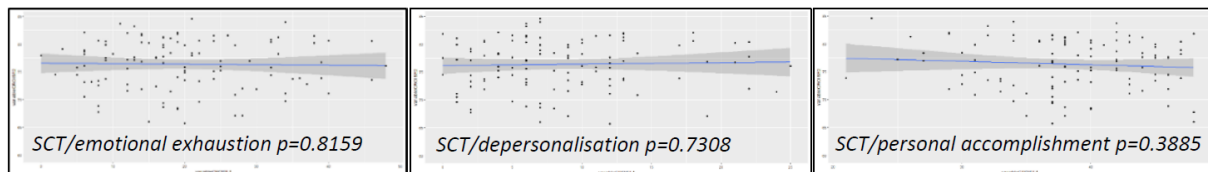
Table 2: burnout dimensions Means-Standard Deviations

Burnout dimensions scores n=111	Mean	SD
Emotional exhaustion	19.80	10.76
Depersonalization	8.47	5.84
Personal accomplishment	38.09	5.88

SCT and MBI score association

There was no statistically significant correlation between SCT scores and the emotional exhaustion, depersonalization and personal accomplishment dimension scores. Those results are illustrated in figure 1.

Figure 1: SCT/burnout dimensions scores. correlation coefficient of Pearson



Mean SCT scores were similar between the groups irrespective of burnout severity. Those results can be seen in table 3.

Table 3: Comparison of SCT Means(SD) by burnout severity

	Mean SCT score (IC95%)	p value
Burnout absence n=71	76.34 (67.60-83.31)	p=0.7936
Mild burnout n=19	76.36 (66.34-83.09)	
Moderate burnout n=19	76.57 (70.96-81.90)	
Severe burnout n=2	73.77 (73.70-73.82)	

Discussion

Reminder of the main results

111 (86.71%) students in general practice participated in the study. 2 participants had a severe burnout level, 19 (17.12%) a moderate level, 19 (17.12%) a low level, and 71 (63.96%) had no burnout. The mean SCT score was 76.16. There was no statistically significant association between SCT and MBI results.

Comparison with literature data

The burnout scores found in our study are similar to those found in the literature (23). Likewise, SCT scores are comparable to the values expected for such an examination (22). Those two findings reinforce the value of our results. Conversely, it is surprising to note that some participants had a high

depersonalization score without suffering from emotional exhaustion. This contradicts Christina Maslach's work establishing a continuum, or a causality, between emotional exhaustion resulting from excessive work demands, and the progressive distancing from the patients making the demands (2,3). Depersonalization is a protective response to excessive work demands to protect oneself from the resulting emotional exhaustion (3). A hypothesis should be explored concerning the association of a high depersonalization score with a low emotional exhaustion score in some students. Is it a cultural attitude adopted during medical training? Or is it an unconscious defense mechanism developed through previous painful experiences by students and physicians (24)?

How then should we interpret this lack of statistically significant association between SCT and MBI-HSS scores?

The tool chosen to measure clinical reasoning performance examines classification, hierarchization and selection tasks of initial hypotheses based on additional information provided in the wording of the questions. Those are the rational cognitive tasks corresponding to the analytical part of clinical reasoning (13,14). Burnout manifests in clinicians as a defense response to excessive emotional demands stemming from the professional and personal environment (3,25). It affects the emotional state through the dimensions described by Christina Maslach et al.: emotional exhaustion, depersonalization and reduced personal accomplishment. The role of emotions in clinical reasoning isn't clear, but many authors suggest that they might influence it, especially the intuitive part (14,26).

The concept of emotional intelligence includes the clinicians' ability to take into account their emotional state in their practice (27). This emotional competence is thought to contribute to decision-making capacity and patient healthcare safety (26). We can assume that emotions might influence the intuitive part of reasoning at the initial level for hypotheses generation and at the final level for the holistic view of the clinical status of the patient (15).

We notice a decrease in SCT scores with increased burnout level. Maybe there is an association that our study doesn't reflect because it lacks power. A larger sample size could probably show a statistically significant difference between the groups. But even if such a difference existed, would it be clinically significant? The estimated effect size would be much lower than a standard deviation.

Strengths and limitations

The main strength of our study is its originality, with little accessible data on the comparative study between burnout and a test of clinical reasoning. It measured the consequences of burnout on the efficacy of analytical reasoning in physicians.

The neutrality of the data collection environment limits the effect of burnout, which is especially linked to working conditions. Its effect can be mitigated outside of the usual workplace, as is the case with our study. Having the subject perform the task under usual workplace conditions would make our research more valid.

Conclusion

This study suggests that burnout has no effect on the analytical dimension of the clinical reasoning process. Further more powerful work could verify this lack of association. It would be useful to test a potential link between burnout and the intuitive dimension of the clinical reasoning process.

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