

Efficiency of information technologies for measure the level Burnout Syndrome, a systematic review

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Abstract: Burnout Syndrome or burn syndrome is a disease caused by exhaustion or work overload, this has a high impact due to the consequences occurring in different situations. This document presents a systematic review of the literature on the impact of information technologies to measure the level of burnout syndrome. We reviewed 65 articles from the period 2015-2020 on Burnout syndrome with indicators like causes, consequences and treatments from the databases IEEE Xplore, Scencedirect, SpringerLink and Proquest.

1. INTRODUCTION

The Burnout Syndrome is explained as a state of stress in which there is a significant physical or emotional state of exhaustion of the body. (1) Burnout syndrome is more common in medical professionals, but also to staff who develop different responsibilities, they often present various symptoms such as depression, mood swings, loss of appetite, anxiety. These symptoms can also affect the patients of health professionals suffering from burnout syndrome. (2). Burnout is more prevalent in Asians and American countries than in Europe (3). Many studies conducted in different places shown that the area of intensive care units are the places in which people are more prone and have a high risk of contracting this syndrome, the prevalence among doctors and nurses who work more than the established hours in ICU are between 25% and 80% subject to contracting burnout syndrome (4).

The purpose of this review is to provide a clear picture of the current status of people who suffer from burnout syndrome, in order to know the level or state of the user's condition. This work is focused on determining the status or level of the syndrome in order to propose solutions with respect to information technologies that help identify a medical problem

In addition, what is the effectiveness of the use of IT for burnout syndrome? This research paper is organized as follows: Section 2 presents the methodology used for the review of the study documents, Section 3 presents the results of the SRL and finally Section 4 presents the conclusions and discusses some research questions for the future.

A thorough review of the existing research articles in the literature has been carried out.

2. METHODOLOGY

2.1 Research questions

TABLE I RESEARCH QUESTION

ID	Research Question	Justification
RQ 1	What IT or technique is most commonly used for Burnout Syndrome?	Identify what type of IT or technique is most commonly used for the study of Burnout syndrome.
RQ 2	Which continents make the greatest use of IT tools for the study of Burnout syndrome?	Determine in which continents the study of Burnout Syndrome is most prevalent
RQ 3	Which IT tool is most effective in the study of Burnout syndrome?	Identify the effectiveness of IT tools used for Burnout syndrome.

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guide will be used to write the article based on the systematic reviews in this article.

2.2 Search Strategy

With the objective to solve the above research questions, we reviewed articles and SLRs from the following databases: IEEEExplore, ScienceDirect, SpringerLink and PROQUEST, we found 39 articles between 2015-2020.

The following words were used to search for these articles: "burnout syndrome", "IT", "SLR", "IT for stress".

2.3 Inclusion and exclusion criteria

Criterion E1 was applied in the first filter to reduce the number of articles investigated. For the second filter, criteria I1, I2 and I3 were applied, For the second filter, criteria I1, I2 and I3 were applied, according to which 10 were eliminated; with criterion I4, articles related to the problem were filtered and 5 were eliminated. After determining criteria E2 and E3, 50 review articles were concluded

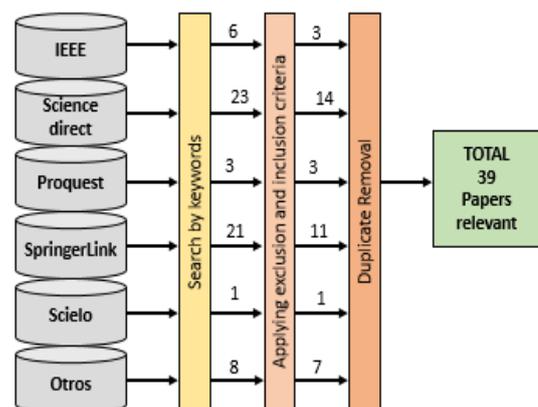


Fig. 1 Prisma Diagram Methodology

TABLE II INCLUSION AND EXCLUSION CRITERIA

Criteria		
Inclusion	I1	Articles related to the use of IT in medical problems such as Burnout syndrome.
	I2	Articles published from 2015 to 2020
	I3	Articles under the SLR method
	I4	Articles with Burnout syndrome as a problem
Exclusion	E1	Similar articles in several databases
	E2	Articles published in different years
	E3	Articles with other review methodology

Fig. 2 Number of databases found by year

2.4 Methods of analysis and item extraction

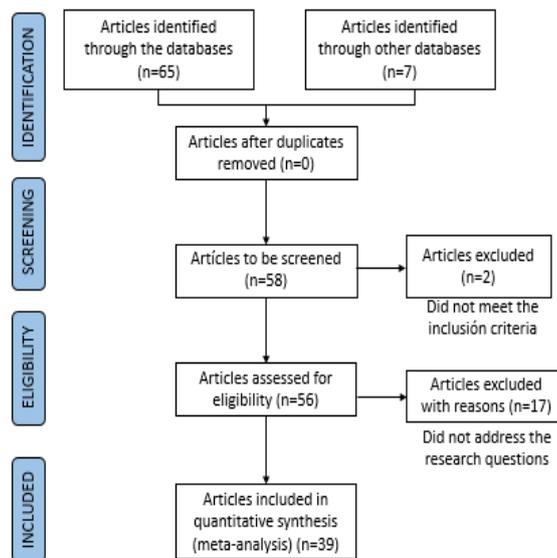
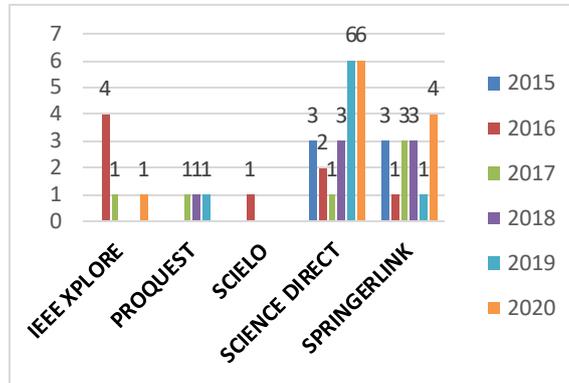


Fig. 3 Article analysis and extraction

Sixty-five articles found in the databases related to the subject were analyzed, of which seven articles were discarded because they were from other databases, leaving 56, of which 17 were eliminated, leaving 39.

3. RESULTS

3.1 Number of databases found per year



According to the graph in the Science direct database more articles were found between 2019 and 2020.while the IEEE xplore, Proquest and Scielo databases did not find many articles.

3.2 Charts answering the questions

3.2.1 Articles found by Continent and IT tool

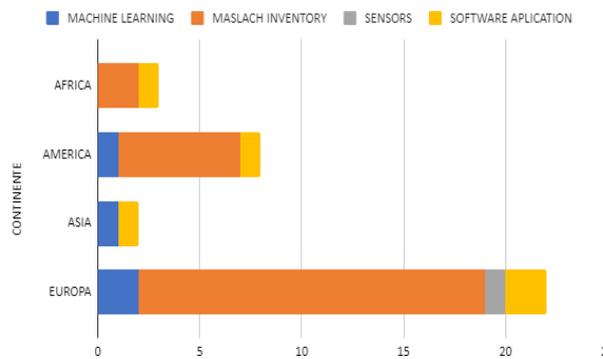


Fig. 4 IT tool per continent

According to Figure IV, in the continent of Europe, Africa and Asia there are more IT tools for Burnout syndrome, as well as derived, while in Africa it was found an article with application of IT tool.

3.2.2 Articles found according to technique and IT tool.

TABLE III ARTICLES FOUND ACCORDING TO TI TECHNIQUE AND TOOLS

Tool or Technique	Articles found
Machine	According to the

<i>Learning</i>	authors:(Govêia <i>et al.</i> , 2018),(Panicker and Gayathri, 2019),(Sağbaşı, Korukoglu and Balli, 2020).
<i>Data Mining</i>	According to the author: (Mosquera, Parra-Osorio and Castrillón, 2016).
<i>Mobile Application</i>	According to the authors: Solís-Galván J.A., (2021),(Rohani <i>et al.</i> , 2018),Humasgi S,2018.
<i>Software Application</i>	According to the authors:(Torous <i>et al.</i> , 2019),(Hung and Picard, 2016).(Di Alesio and Sen, 2018),(Sağbaşı, Korukoglu and Balli, 2020),(Asgari, Jafari and Ramazani, 2017),(Shen and Spruit, 2019).
<i>Maslach Burnout Inventory</i>	According to the authors:(Macía-Rodríguez <i>et al.</i> , 2020),(Mutair <i>et al.</i> , 2020),(Faivre, G., Kielwasser,2018),(Juliá-Sanchis <i>et al.</i> , 2019),(Martinelli, Frattolillo and Sansone, 2020),(Vévodová <i>et al.</i> , 2016), (Hall, Schmader and Croft, 2015), (Maldonado-Macías <i>et al.</i> , 2015), (Rohani <i>et al.</i> , 2018),(Rizo-Baeza <i>et al.</i> , 2018),(Torre, Santos Popper and Bergesio, 2019),(Thomas, Bantz and McIntosh, 2019),(Pliss and Perova, 2017),(Timenetsky <i>et al.</i> , 2015).Myakotnykh, V. S. and Borovkova, T. A. (2017),(Hamed, Abd

	Elaziz and Ahmed, 2020),(Njim <i>et al.</i> , 2018),(Fumis <i>et al.</i> , 2017), Grigorescu, S., Cazan, AM., Grigorescu, O.D. <i>et al.</i> (2018),(Monsalve-Reyes <i>et al.</i> , 2018), (Nolan, Dockrell and Crowe, 2020),(Schoeps <i>et al.</i> , 2019).
<i>Sensors</i>	(Kikhia <i>et al.</i> , 2018)

According to the table III, Maslach Burnout Inventory is the most used technique. While Mobile application and use of Software application with a number of 3 articles found and 1 with Data Mining application.

3.2.3 IT tools and technique with greater effectiveness with respect to Burnout syndrome

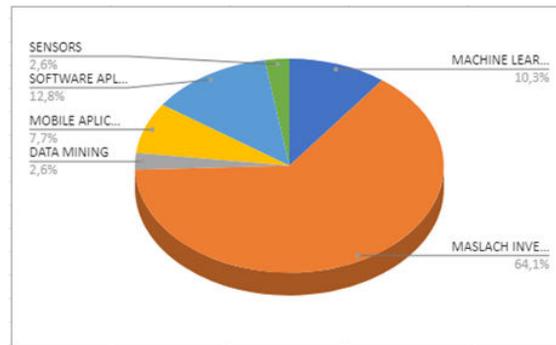


Fig. 5 Effectiveness of IT techniques and tools

According to the graph, the use of application software for the study of Burnout syndrome is more efficient, as well as mobile applications and analysis with Machine Learning.

Articles	Results
(Govêia <i>et al.</i> , 2018),(Panicker and Gayathri, 2019),(Sağbaşı, Korukoglu and Balli, 2020).	According to the results obtained from the questionnaire, machine learning approaches were applied to predict the symptoms of burnout and by applying an emotion detection system, the different machine learning prediction models obtained an accuracy of more

	than 70% of the cases.
(Mosquera, Parra-Osorio and Castrillón, 2016)	In this article, an 1100 sample was analyzed by applying data mining techniques and J48 and Naive Bayes classification trees, allowing a higher accuracy compared to the clinical diagnosis.
(Solís-Galván J.A., <i>et al.</i> , 2021), (Rohani <i>et al.</i> , 2018), Hunasgi, S., Koneru, A., Rudraraju, A., Manvikar, V., & Vanishree, M. (2018)	These articles found that the values analyzed using software and sensors were significantly higher compared to traditional tests, and the results were evaluated using a paired t-test.
(Torous <i>et al.</i> , 2019), (Hung and Picard, 2016), (Di Alesio and Sen, 2018), (Asgari, Jafari and Ramazani, 2017), (Shen and Spruit, 2019),	Through the use of Pearson's correlation coefficient, the variables to be analyzed showed a significant relationship, giving greater precision on the organizational stressors.
(Macía-Rodríguez <i>et al.</i> , 2020), (Mutair <i>et al.</i> , 2020), (Faivre, G., Kielwasser, H., Bourgeois, M., Panouilleres, M., Loisel, F., & Obert, L. 2018), (Juliá-Sanchis <i>et al.</i> , 2019), (Martinelli, Frattolillo and Sansone, 2020), (Vévodová <i>et</i>	The study was carried out with the Maslach Burnout questionnaire and basic empathy scale, where the correlation between the quality of life of the respondents and the level of burnout was demonstrated.

<p><i>al.</i>, 2016),(Hall, Schmader and Croft, 2015),(Njim <i>et al.</i>, 2018),(Rohani <i>et al.</i>, 2018),(Martinelli, Frattolillo and Sansone, 2020),(Rizo-Baeza <i>et al.</i>, 2018),(Torre, Santos Popper and Bergesio, 2019), (Thomas, Bantz and McIntosh, 2019),(Pliss and Perova, 2017),(Timenetsky <i>et al.</i>, 2015), (Myakotnykh, V.S., Borovkova, T.A.,2017), (Hamed, Abd Elaziz and Ahmed, 2020),(Njim <i>et al.</i>, 2018),(Fumis <i>et al.</i>, 2017),(Rizo-Baeza <i>et al.</i>, 2018), (Grigorescu, S. 2018),(Monsalve-Reyes <i>et al.</i>, 2018),(Nolan, Dockrell and Crowe, 2020),(Schoeps <i>et al.</i>, 2019)</p>	
<p>(Kikhia <i>et al.</i>, 2018)</p>	<p>The results indicate that the information extracted from the sensors can facilitate and improve the understanding of behavioral patterns and, as a consequence, the efficiency of care interventions, generating a positive impact on the quality of the clinical assessment process of individuals.</p>

4. DISCUSSIONS

According to the above mentioned, the following questions are justified:

RQ1: What IT or technique is most commonly used for Burnout Syndrome?

According to Table III, the most used technique is the Maslach Inventory questionnaire for the prognosis of Burnout syndrome, which determines the level of stress or anxiety that a person has in their work environment. With respect to the tools used for the treatment and detection of burnout syndrome, Software application and Machine learning are used for the analysis of indicators such as symptoms and possible consequences, as well as Mobile application, since it uses software implemented with sensors to determine physiological factors.

RQ2: Which continents make the greatest use of IT tools for the study of Burnout syndrome?

According to the results shown in Figure 4, continents such as Europe, America and Asia have a greater impact of the implementation of IT tools due to the effectiveness in obtaining indicators and analysis. Although software is currently being developed for the health area, but the level is very low with respect to psychological problems such as this syndrome.

RQ3: Which IT tool is most effective in the study of Burnout syndrome?

According to Figure 6 and Table IV, as a technique the use of the Maslach Inventory questionnaire as it allows to identify the symptoms of burnout, in the case of IT tool, the application of Machine Learning and software application have an intermediate percentage because according to the data obtained from a software or mobile application can create predictive algorithms for them most of the articles found have a high percentage accuracy. The use of mobile applications has a percentage of 21.4 %, an average effectiveness can be determined since it does not evaluate the results of symptoms with respect to burnout syndrome, but it does fulfill its role as a means of data extraction.

5. CONCLUSIONS

This article presented a systematic review of the literature on the effectiveness of information technologies to measure burnout syndrome, considering articles from 2015 to 2020, systematizing 65 articles, concluding that the use of software or mobile applications allows a better extraction and measurement of the symptoms of burnout syndrome and the analysis with Machine learning would help us to predict when a person has a tendency to suffer from this syndrome and would help many companies to propose preventive solutions. That is why it is recommended to develop mobile applications with the Maslach Burnout Inventory test, since this assessment allows to accurately determine the symptoms of Burnout syndrome. The results of this systematic review may allow us to consider further research on the application of information technologies in diseases derived from Burnout syndrome.

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