Occupational Psychosocial Risks of Health Professionals

Mohammed Amine Lafraxo[1,], Mohammed Ouadoud[2], Youssef El Madhi[3]*, and *Abdelmajid Soulaymani[1]*

[1] Faculty of Science, Ibn Tofail University, Kenitra, Morocco
[2] National School of Applied Sciences, Abdelmalek Essaadi University, Tetouan, Morocco
[3] Regional Center for Education and Training Trades, Rabat, Morocco

Abstract. This study aimed to evaluate the Effort-Reward Imbalance among nurses and its association with burnout syndrome. This is an observational study of a cross-sectional type. A self-administered survey was used to collect the socio-demographic and professional characteristics. The Siegrist Effort-Reward Imbalance scale to measure the psychosocial risks and the Copenhagen Burnout Inventory to assess burnout. The results indicate that the level of burnout is moderate [patient-related burnout (2.77 ± 0.95), general burnout (3.00 ± 0.67)], but there is an imbalance between the efforts and rewards received by nurses (1.50 ± 0.51). The indices calculated by Cronbach's alpha are very important for effort ($\alpha=0.79$), and reward ($\alpha=0.75$). The results raise questions about the importance of a better understanding of the effect of psychosocial risks on health through perceived effort/reward. The use of information and communication technologies to accurately identify psychosocial risks at work is recommended.

1 Introduction

The theme of psychosocial factors at work in the epidemiology of occupational risks has grown considerably in recent years, particularly in occupations where there are many social interactions. The Siegrist model was developed to assess the psychosocial constraints of the work environment, it is a model of the imbalance between effort and rewards at work [1]. In this model, Siegrist considers that the efforts made by the individual at work are part of an aspect of a social reciprocity agreement in which the individual receives a reward in the form of salary, career development, esteem, and job security [2]. It is therefore the imbalance between the reward obtained and the efforts made that could be at the origin of both psychological and somatic effects, so it can have consequences on musculoskeletal disorders, cardiovascular diseases, etc [3]. According to Siegrist, the employee will put effort into the work and he expects that this work will provide him with rewards (feeling of self-efficacy, self-esteem...). Siegrist identifies two main categories of effort, extrinsic and intrinsic [4]. Extrinsic effort corresponds to the constraints of the work; they include time constraints, numerous responsibilities, increased demand, and frequent interruptions. The extrinsic effort is also related to the physical effort required and the obligation to work overtime. Intrinsic efforts, also known as overcommitment, reflect the motivations and attitudes related to excessive commitment to work or controlling a threatening situation

[5], the individual's involvement in the work will therefore be more extensive, serving more resources, including in situations where earnings will be relatively low [6]. In this model, rewards can take three main forms, namely: monetary gains (bonuses, salaries, etc.), the esteem received from superiors and colleagues, and the degree of control over one's professional status (job security, promotion prospects, etc.) [7]. This model predicts that the lack of reciprocity between gains and costs can lead to stress and burnout syndrome.

This article is composed of three main sections:

- In the first section, we present the research methodology adopted to measure effort-reward imbalance and to evaluate burnout syndrome.
- In the second section, we reveal the results of the survey.
- In the third section, we tried to compare the results found with results from other studies, and suggest IT solutions for dealing with psychosocial risks.

2 Methods

2.1. Data collection

This is an observational study of a cross-sectional type [8], the data collected with the help of a self-administered questionnaire made up of three sections:

---

* Corresponding author: lafraxo.ma@gmail.com

- The sociodemographic, professional, and personal characteristics (gender, age, marital status, specialty, years of experience, diet, food supplements, sport).
- The effort-reward imbalance was measured by the Siegrist effort-reward imbalance scale [9]–[11]. This instrument has been adapted and validated in French by Niedhammer. It has three sub-scales: the first is effort, which is measured by six items that refer to demanding situations of the work environment, a total sum score based on the six items measuring effort varies between 6 and 30. The second is a reward, which is measured by eleven items that refer to reward-related to promotion prospects, esteem, and job security, a total sum score based on the eleven items measuring reward varies between 11 and 55. Responses are measured on a 5-point Likert scale. The scoring procedure for effort and reward is defined as (1) does not apply; (2) does apply, but the subject does not consider herself or himself distressed; (3) does apply and subject considers herself or himself somewhat distressed; (4) does apply and subject considers her or himself distressed; (5) does apply and subject considers herself and himself very distressed. The effort/reward imbalance (ERI) score is obtained by calculating a ratio of the effort score to the reward score [11, 12].

$$\text{Ratio} = \frac{11}{6} * \frac{\text{Effort Score}}{\text{Reward score}}$$

As a result, a value close to zero indicates a favorable condition (relatively low effort, relatively high reward), whereas values beyond 1 indicate a high amount of effort spent that is not met by the rewards received or expected in turn. The last is over-commitment, which is measured by six items. The six 4-point Likert scaled items are computed to a total score varying from 6 to 24. The higher the score, the more likely a subject is to be overcommitted to work.

- The burnout was assessed using the Copenhagen Burnout Inventory [12]–[17]. The result of the Copenhagen Burnout Inventory is a score defined as:

  - low: 1 to 2.4;
  - medium: 2.5 to 3.5;
  - high: 3.6 to 5.

2.2 Statistical analysis

The result of the Effort-Reward Imbalance and the Copenhagen Burnout Inventory was verified and processed using IPM-SPSS software. The Fisher Exact Test has been used to identify any associations between burnout syndrome and the effort/reward imbalance.

3 Finding of the survey

3.1 Sample characteristics

The present study involved 30 nurses out of a total of 53 healthcare professionals at the Hassan II Oncology Centre – Oujda, Morocco. 13 men and 17 women. Nurses are mostly single with a proportion of 63%. The mean age is 29 years (29 ± 5.85). The age of the nurses is between 21 and 51 years.

3.2 Effort-Reward: Imbalance

This model has 3 sub-scales: Extrinsic efforts (18.43 ± 5.4), the scale of rewards (23.9 ± 7.47), and the scale of over-commitment (16.41 ± 3.6). The ratio (effort/reward) calculated according to the Siegrist questionnaire shows a rate of 1.5 for all participants (see Tab. 1), so there is an imbalance between their efforts and the rewards received. The indices calculated by Cronbach's alpha are very important for effort (α = 0.79), and reward (α = 0.75).

Table 1. Averages and standard deviations over the three sub-scales of the Siegrist model

Sexe		Effort	Reward	Ratio	Overcommitment
Women	Average	18,11	23,94	01,49	16,41
	SD	05,01	07,47	00,53	03,60
Man	Average	18,84	24,23	01,53	16,07
	SD	06,16	09,20	00,51	03,59
Total	Average	18,43	24,06	01,50	16,26
	SD	05,44	08,11	00,51	03,54

3.3 Burnout: prevalence

The analysis of the results revealed that 20% of the participating nurses had a low general burnout score, 63% had a medium score, and 16% had a high score. Regarding burnout related to the patient, 43% had a low score (23% high and 34% medium) (see Tab. 2). The average patient-related burnout score was (2.77 ± 0.95) and the average for general burnout was (3.00 ± 0.67), this means that the level of burnout among nurses is moderate.

Table 2. Distribution of the population according to Copenhagen Burnout Inventory score

CBI	Patient-related burnout score			General burnout score		
	Average	SD	Total	Average	SD	Total
High	04,19	00,51	23%	04,13	00,43	16,7%
Low	01,96	00,36	43%	02,13	00,19	20,0%
Medium	02,83	00,22	34%	02,97	00,29	63,3%

3.4 Effort-Reward and burnout

From an observational point of view, burnout in its General Burnout component is statistically unrelated to the Ratio (Effort/Reward): the result shows a higher ratio for nurses with moderate burnout (01.64 ± 00.56) against

(01.38 ± 00.32) with low burnout and (01.12 ± 00.24) with high burnout (see Tab. 3).

Table 3. General Burnout and sub-scales of the Effort/Reward model

General Burnout		Effort	Reward	Ratio	Overcommitment
High	Average	17,40	29,00	01,12	17,80
	SD	03,64	06,44	00,24	02,38
Low	Average	19,33	26,66	01,38	14,83
	SD	06,34	09,35	00,32	04,49
Medium	Average	18,42	21,94	01,64	16,31
	SD	05,75	07,67	00,56	03,46
Total	Average	18,43	24,06	01,50	16,26
	SD	05,44	08,11	00,51	03,54

From an observational point of view, burnout in its Patient-Related Burnout component is statistically unrelated to the Ratio (Effort/Reward): the result shows a higher ratio for nurses with low burnout (01.60 ± 00.63) against (01.43 ± 00.40) with moderate burnout and (01.38 ± 00.58) with high burnout (see Tab. 4).

Table 4. Patient-Related Burnout and sub-scales of the Effort/Reward model

Patient-related burnout score		Effort	Reward	Ratio	Overcommitment
High	Average	17,14	24,57	01,38	16,42
	SD	04,29	06,21	00,58	03,55
Low	Average	17,53	21,84	01,60	15,61
	SD	05,01	07,62	00,63	03,06
Medium	Average	20,50	26,60	01,46	17,00
	SD	06,53	09,73	00,24	04,26
Total	Average	18,43	24,06	01,50	16,26
	SD	05,44	08,11	00,51	03,54

No statistically significant association was found in this study using the Fisher Exact Test at the threshold of $(p=0.05)$, between burnout and the effort/reward model.

4 Related works

This study aims to determine the psychosocial risks in health care professionals using Siegrist's model of effort-reward imbalance and to identify any association between burnout syndrome and effort-reward imbalance. This study revealed that the ratio (effort/reward) calculated according to the Siegrist questionnaire shows a rate of 1.5 for all participants, which is similar to the result found in a study involving medical and paramedical personnel of the SAMU/SMUR in Tunisia [18]. Analyses using the Fisher Exact Test have not revealed any significant link between the effort/reward model and other variables at the threshold of $(p=0.05)$. On the other hand, in another study that aims to investigate the impact of psychosocial factors among nurses, they showed that there was a significant association between marital status and effort-reward imbalance and that married nurses experienced more stress than single nurses [19]. Another research was conducted to investigate whether organizational constraints at the work unit level can be related to depressive symptoms in hospital workers, in which they indicated that a better understanding of the effect of psychosocial risks on health through perceived effort/reward imbalance would provide targets for successful interventions [20]. A research study was conducted among Japanese workers to assess the prospective effects of psychosocial job characteristics evaluated with the Demand-Control-Support and Effort–Reward Imbalance models on insomnia [21]. It revealed that low social support and effort-reward imbalance at the baseline had a significant association with insomnia at the follow-up. The Effort–reward imbalance is related to the frequency of sickness absence among hospital nurses. According to research among nurses, nurses who are frequently absent perceived poorer health had lower overcommitment scores, and reported a higher ratio (effort/reward) than low frequent absentees [22].

Recently, several research studies have proposed IT solutions to public health problems, in particular, to facilitate communication between health professionals and patients (see Fig. 1). It is through the use of information and communication technologies [23]–[25]. Some research has proposed mobile platforms to assess the level of stress or burnout to prevent psychosocial risks [26, 27].
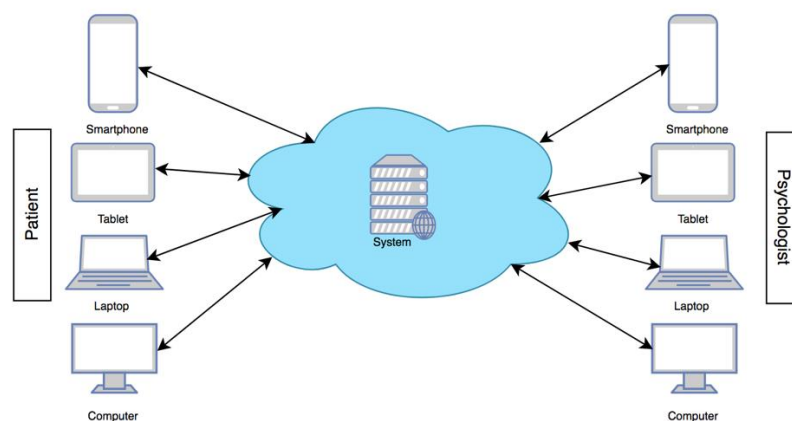

Figure 1. Communication network architecture [28]

5 Conclusion and Future Work

The study states that there is an imbalance between the efforts and the rewards received among nurses. The results raise questions about the importance of the better understanding of the effect of psychosocial risks on health through perceived effort/reward imbalance would provide targets for effective coping strategies. The continuation of this research work could also focus on the use of information and communication technologies to accurately identify psychosocial risks at work.

References

1. J. Siegrist. Adverse health effects of high-effort/low-reward conditions. J Occup Health Psychol, vol. **1**, no. 1, pp. 27–41, Jan. 1996, DOI: https://doi.org/10.1037//1076-8998.1.1.27

2. F. Chapelle. Modèle de Siegrist. Dunod, 2018, pp. 113–117. Available: https://www.cairn.info/risques-psychosociaux-et-qualite-de-vie-au-travail--9782100781447-page-113.htm

3. T. Machado. Reconnaissance au travail. vol. **2**e éd. Dunod, 2019, pp. 365–368.

4. M. Lourel and C. Mabire. Le déséquilibre efforts-récompenses et les débordements entre vie au travail, vie privée chez les éleveurs laitiers : leurs effets sur l'épuisement professionnel. Sante Publique, vol. Vol. **20**, no. hs, pp. 89–98, Aug. 2008. Available: http://www.cairn.info/revue-sante-publique-2008-hs-page-89.html

5. M. Vézina, R. Bourbonnais, C. Brisson, and L. Trudel. Définir les risques. Actes de la recherche en sciences sociales, vol. no **163**, no. 3, pp. 32–38, Nov. 2006. Available: http://www.cairn.info/journal-actes-de-la-recherche-en-sciences-sociales-2006-3-page-32.htm

6. I. Niedhammer and J. Siegrist. Facteurs psychosociaux au travail et maladies cardio-vasculaires: l'apport du modèle du Déséquilibre Efforts/Récompenses. Rev Epidemiol Sante Publique, vol. 46, no. 5, pp. 398–410, Nov. 1998. Available: https://www.lissa.fr/rep/articles/9864769

7. P. Légeron. Le stress professionnel. L'information psychiatrique, vol. Volume **84**, no. 9, pp. 809–820, 2008. Available: http://www.cairn.info/revue-l-information-psychiatrique-2008-9-page-809.htm

8. E. Bourgkard, V. Demange, and C. Aubry. L'épidémiologie en santé au travail. INRS, 2004.

9. I. Niedhammer, J. Siegrist, M. F. Landre, M. Goldberg, and A. Leclerc. Étude des qualités psychométriques de la version française du modèle du Déséquilibre Efforts/Récompenses. Rev. Epidém. et Santé Publ, 2000. Masson, Paris.

10. J. Siegrist, D. Starke, T. Chandola, I. Godin, M. Marmot, I. Niedhammer, and R. Peter. The measurement of effort-reward imbalance at work: European comparisons. Social Science & Medicine, vol. **58**, no. 8, Art. no. 8, Apr. 2004, DOI: https://doi.org/10.1016/S0277-9536(03)00351-4

11. J. Siegrist. Chapter 9 - Effort-Reward Imbalance Model. in Stress: Concepts, Cognition, Emotion, and Behavior, G. Fink, Ed. San Diego: Academic Press, 2016, pp. 81–86. DOI: https://doi.org/10.1016/B978-0-12-800951-2.00009-1

12. M. Estryn-Behar, M.-H. Braudo, C. Fry, and K. Guetarni. Comparative survey of professional burnout among psychiatrists and other specialists in French Public Hospitals (SESMAT Enquiry). L'information psychiatrique, vol. **87**, no. 2, Art. no. 2, 2011, DOI: https://doi.org/10.3917/inpsy.8702.0095

13. M.-A. Doppia, M. Estryn-Béhar, C. Fry, K. Guetarni, and T. Lieutaud. Burnout in French doctors: A comparative study among anaesthesiologists and other specialists in French hospitals (SESMAT study). Annales Françaises d'Anesthésie et de Réanimation, vol. **30**, no. 11, Art. no. 11, Nov. 2011, DOI: https://doi.org/10.1016/j.annfar.2011.05.011

14. M. Estryn-Béhar, B. Van der Heijden, H. Oginksa, D. Camerino, O. Le Nézet, P. M. Conway, C. Fry, and H-M. Hasselhorn. The Impact of Social Work Environment, Teamwork Characteristics, Burnout, and Personal Factors Upon Intent to Leave Among European Nurses. Medical Care, 2007, DOI: https://doi.org/10.1097/MLR.0b013e31806728d8

15. M. Borritz, R. Rugulies, J. B. Bjorner, E. Villadsen, O. A. Mikkelsen, and T. S. Kristensen, .Burnout among employees in human service work: design and baseline findings of the PUMA study. Scandinavian Journal of Public Health, vol. **34**, no. 1, Art. no. 1, Jan. 2006, DOI: https://doi.org/10.1080/14034940510032275

16. V. Langevin, S. Boini, M. François, and A. Riou. Copenhagen Burnout Inventory (CBI) (Inventaire de burnout de Copenhague). Références en santé au travail - Risques psychosociaux : outils d'évaluation - FRPS 38, 2014.

17. T. S. Kristensen, M. Borritz, E. Villadsen, and K. B. Christensen. The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. Work & Stress, vol. **19**, no. 3, pp. 192–207, Jul. 2005, DOI: https://doi.org/10.1080/02678370500297720

18. H. Aroui and al. Déséquilibre efforts/récompenses des équipes mobiles d'urgence pré-hospitalière tunisienne. Archives des Maladies Professionnelles et de l'Environnement, vol. **81**, no. 5, pp. 623–624, Oct. 2020, DOI: https://doi.org/10.1016/j.admp.2020.03.519

19. T. Y. Zaree, J. Nazari, M. Asghary Jafarabadi, and T. Alinia. Impact of Psychosocial Factors on Occurrence of Medication Errors among Tehran Public Hospitals Nurses by Evaluating the Balance between Effort and Reward. Safety and Health at Work, vol. **9**, no. 4, pp. 447–453, Dec. 2018, DOI: https://doi.org/10.1016/j.shaw.2017.12.005

20. A. Jolivet and al. Linking hospital workers' organisational work environment to depressive symptoms: A mediating effect of effort–reward imbalance? The ORSOSA study. Social Science & Medicine, vol. **71**, no. 3, pp. 534–540, Aug. 2010,

---
* Corresponding author: lafraxo.ma@gmail.com

DOI:
https://doi.org/10.1016/j.socscimed.2010.04.003

21. A. Ota and al. Psychosocial job characteristics and insomnia: A prospective cohort study using the Demand-Control-Support (DCS) and Effort–Reward Imbalance (ERI) job stress models. Sleep Medicine, vol. **10**, no. 10, pp. 1112–1117, Dec. 2009, DOI: https://doi.org/10.1016/j.sleep.2009.03.005

22. J. A. H. Schreuder, C. A. M. Roelen, P. C. Koopmans, B. E. Moen, and J. W. Groothoff. Effort-reward imbalance is associated with the frequency of sickness absence among female hospital nurses: a cross-sectional study. Int J Nurs Stud, vol. **47**, no. 5, pp. 569–576, May 2010, DOI: https://doi.org/10.1016/j.ijnurstu.2009.10.002

23. A. Omotosho, P. Ayegba, J. Emuoyibofarhe, and C. Meinel. Current State of ICT in Healthcare Delivery in Developing Countries. International Journal of Online and Biomedical Engineering (iJOE), vol. **15**, no. 08, p. 91, May 2019, DOI: https://doi.org/10.3991/ijoe.v15i08.10294

24. F. Sanfilippo and C. Pacchierotti. A Wearable Haptic System for the Health Monitoring of Elderly People in Smart Cities. International Journal of Online and Biomedical Engineering (iJOE), vol. **14**, no. 08, p. 52, Aug. 2018, DOI: https://doi.org/10.3991/ijoe.v14i08.8571

25. M. M. Abdellatif and W. Mohamed. Telemedicine: An IoT based Remote Healthcare System. International Journal of Online and Biomedical Engineering (iJOE), vol. **16**, no. 06, p. 72, May 2020, DOI: https://doi.org/10.3991/ijoe.v16i06.13651

26. M. A. Lafraxo, M. Ouadoud, Y. El Madhi, M. Rehali, and A. Soulaymani. Burnout Syndrome Prevention Measures among Nursing Staff: Implementing a Mobile Application based on MIT's App Inventor Tool using the Scratch Programming Code. International Journal of Online and Biomedical Engineering (iJOE), vol. **17**, no. 04, p. 15, April. 2021, DOI: https://doi.org/10.3991/ijoe.v17i04.20393

27. A. Baharum, S. H. Tanalol, C. Xu Jian, M. Omar, N. A. Mat Noor, and N. M. Mohd Yusop. Stress catcher application for mobile stress monitoring using questionnaire-based. IJEECS, vol. **16**, no. 2, p. 917, Nov. 2019, DOI: https://doi.org/10.11591/ijeecs.v16.i2.pp917-924

28. M. A. Lafraxo, M. Ouadoud, Y. El Madhi, and A. Soulaymani. Burnout Syndrome among Nursing Staff: Performing Data Analysis using the SPSS Statistic. International Journal of Online and Biomedical Engineering (iJOE), vol. **17**, no. 04, p. 11, April. 2021, DOI: https://doi.org/10.3991/ijoe.v17i04.20979