

VIZSGÁLATOK

Factors affecting burnout among Hungarian Information Technology workers - pilot study

Kiégést befolyásoló tényezők magyarországi információtechnológiai dolgozók körében – pilot vizsgálat

Authors: Boróka Gács, András Matuz, Gergely Fehér, Antal Tibold, Krisztián Kapus, Zoltán Bankó, Gyula Berke

Doi: [10.58701/mej.12084](https://doi.org/10.58701/mej.12084)

Keywords: *burnout; occupational health; mental health; IT workers; machine learning*

Kulcsszavak: *kiégés; foglalkozás-egészségügy; mentális egészség; IT dolgozók; gépi tanulás*

Abstract

INTRODUCTION: Studies on mental health and work performance are becoming increasingly important in international literature. However, more information is needed on the extent of burnout in the information technology (IT) sector. Therefore, our pilot research aimed to investigate the area of burnout in the IT sector and identify factors associated with burnout and factors that play a role in predicting burnout.

METHODOLOGY: The research involved an online cross-sectional survey pilot study with 42 IT company employees in Hungary. In addition to demographic and general data, the participants completed questionnaires on burnout, workload, sleep disturbance and negative affectivity.

RESULTS: The results showed that 66.6% (28 persons) of the participants showed symptoms of burnout. The burnout group had significantly higher scores for depression, anxiety, stress, effort, over-commitment and sleeping disorder. In addition, the dimension of burnout was found to be a significant predictor of the dimension of exhaustion, as were the type of residence, number of hours per week and diabetes. Gender, age, marital status, number of children, years of education, years of work, and other health problems did not show significant associations with burnout.

CONCLUSIONS: The results of the pilot study suggest that early detection and prevention of burnout are crucial. The research could significantly contribute to the theoretical knowledge of burnout and hold practical implications for enhancing the mental health of workers in the IT sector, provided that the results can be replicated on a larger sample.

Absztrakt

BEVEZETÉS: A mentális egészséggel és munkateljesítményével kapcsolatos tanulmányok egyre fontosabb témává válnak a nemzetközi szakirodalomban. Azonban kevés információ található az információtechnológiai (IT) szektorban tapasztalható kiégés mértékéről. Ezért a pilot kutatásunk célja az volt, hogy megvizsgáljuk a kiégés mértékét az informatikai ágazatban, valamint feltárjuk a kiégéssel összefüggő és a kiégés előrejelzésében szerepet játszó tényezőket.

MÓDSZERTAN: A kutatásban online kérdőíves keresztmetszeti pilot vizsgálatot végeztünk 42 magyarországi IT dolgozó részvételével. A résztvevők demográfiai és általános adatokon túl a kiégést, munkaterhelést, alvászavart és negatív affektivitást vizsgáló kérdőíveket töltötték ki.

EREDMÉNYEK: Az eredmények azt mutatták, hogy a résztvevők 66,6%-ánál (28 fő) mutatható kiégés tünete. A kiégett csoport szignifikánsan magasabb pontszámokat ért el a depresszió, szorongás, stressz, erőfeszítés, túlvállalás és alvászavar tekintetében. Továbbá a kiégés kimerülés dimenziójának szignifikáns előrejelzőjének bizonyult a lakóhely jellege, a heti óraszám és cukorbetegség. A nem, az életkor, a családi állapot, a gyermekek száma, az iskolai végzettség, a munkával töltött évek száma és más egészségügyi problémák nem mutattak szignifikáns kapcsolatot a kiégéssel.

KÖVETKEZTETÉSEK: A pilot vizsgálat eredményei arra utalnak, hogy a kimerülés korai felismerése és megelőzése létfontosságú. A kutatás hozzájárulhat a kiégéssel kapcsolatos elméleti tudás bővítéséhez és gyakorlati implikációi lehetnek az informatikai ágazatban dolgozók mentális egészségének javításában, amennyiben az eredmények reprodukálhatók egy nagyobb mintán is.

Key messages

Why is the topic discussed in the paper important?

The paper discusses the significance of burnout in the IT sector, especially during the Covid-19 pandemic. Maintaining the mental health of IT workers is crucial for both effective work performance and reducing health-care burdens.

What was known about this topic before?

Previous research provided limited insights into burnout specific to the IT sector. The overview emphasizes the general understanding of burnout, particularly its links to chronic workplace stress and its impact on mental and physical health.

How does this paper contribute to a better understanding of the topic?

The paper presents the results of a pilot study aimed at investigating burnout among IT workers and identifying potential risk factors. Despite a small sample size, the study offers valuable insights into understanding and addressing burnout among IT professionals.

INTRODUCTION

In recent decades, especially during and after the Covid-19 pandemic, studies on mental health and its impact on work performance have become an essential topic in the international literature. Still, little information is available on the extent of burnout among workers in the IT sector (Poulouse, 2023). In general, during the epidemic period, the IT sector showed resilience and resilience to the changing job requirements of working from home. However, research has also shown that the long-term consequences of this, such

as burnout syndrome, are not immediate but are a gradual reaction to emotional exhaustion from prolonged exposure to stressors, leading to a decline in performance, ultimately in a professional sense (Leiter, 1991).

Burnout has been defined as a persistent, long-term response to emotional and interpersonal stressors within the workplace. It is characterised by three primary dimensions: exhaustion, cynicism, and a sense of inefficacy. Burnout syndrome represents a significant occupational challenge across various professions, often originating from chronic work-related stressors. These stressors include insufficient time for proper self-care, excessive workload, and hindering an individual's capacity to regulate and cope with the demands of their work environment. Furthermore, the prevalence of psychosocial distress ranges from 30% to 52% or even higher among individuals working in areas with low subjective control. (Freudenberger & Herbert J., 1975; Maslach et al., 2011). Simultaneously, anxiety and depression frequently exhibit comorbidity with burnout (Koutsimani et al., 2019). Furthermore, over the last two decades, there has been growing evidence that burnout has negative effects on mental and physical health. For example, some research suggests that burnout exceeds the risk levels mediated by classical risk factors such as age, body mass index, smoking, blood pressure and lipid levels for the development of certain diseases, including metabolic syndrome, hypothalamic-pituitary-adrenal axis dysregulation, sleep disorders, systemic inflammation, impaired immune function and cardiovascular disorders (Demerouti & Bakker, 2011). Consequently, prolonged exposure to stress and burnout can lead to maladaptive behaviours like substance abuse and physical illnesses such as cardiovascular, musculoskeletal, and metabolic diseases (Porter, 1996). Therefore,

burnout syndrome can have severe costs, not only at the individual level but also at the organisational and societal level, as it hinders the ability of workers to perform adequately, places an extra burden on the health care system and may ultimately lead to leaving the workplace or career.

In addition, research on organisational development agrees that organisational performance, competitiveness and success are primarily determined by the commitment of the employees who make up organisations. This is particularly true in what is generally described as 'knowledge-based' industries, such as information technology (IT) (Kim, 2012). Indeed, organisations are increasingly demanding IT skills, which makes it easy for IT workers to find new jobs. However, this phenomenon of high turnover of IT workers, in addition to the factors mentioned earlier, may also indicate increased exposure to stress and burnout and, in this context, the presence of other mental health problems (Atouba, 2021). In the literature, organisational commitment, also known as engagement, defined as the 'antithesis' of burnout, is a persistent positive cognitive-emotional state characterised by high levels of energy and resilience, involvement and motivation, as well as pride and inspiration (Schaufeli et al., 2002). One of the most important predictors of this engagement and involvement is the quality of relationships and communication within the organisation and job satisfaction (Atouba, 2021). In contrast, burnout is one of the most significant risk factors against organisational and employee engagement, and it is vital to know how to prevent and intervene in this area and to identify the factors that predict or protect against burnout.

In line with this, our pilot research aimed to investigate the extent of burnout in the IT sector a few years after the outbreak and identify factors associated with burnout,

i.e., that may be risk factors for burnout and predictive of burnout among IT workers. We hypothesise that workers with (1) high levels of negative affect (depression, anxiety and stress), (2) high number of working hours, and (3) subjectively perceived overcommitment are more likely to show symptoms of burnout.

METHODOLOGY

A total of 42 people participated in the cross-sectional exploratory pilot study using an online questionnaire in May 2023 in Hungarian language. The participants were all IT employees of Wolters Kluwer's in Hungary invited to research via email. They participated in the study voluntarily and anonymously and were informed in detail about the scientific use of the data beforehand. All employees contacted completed the questionnaire. The study was approved by the regional ethics committee. The ethics approval number is PTE/96773-2/2018.

The general demographic and work-related data considered in the survey were: gender, age, marital status, type of residence, number of children, education, number of years working and second job, number of hours worked per week, and home office availability. In addition, the following co-morbidities or risk factors were asked: diabetes, hypertension, cardiovascular disease, chronic pain, and diagnosed depression. In addition to demographic and general data, the questionnaire assessed burnout, effort-reward imbalance, sleep disturbances and negative affectivity.

To measure negative affectivity, we used the DASS-21 (shortened version of Depression Anxiety Stress Scale) questionnaire, which assesses the presence of depression, anxiety and stress on a four-point Likert scale using 21 items. Each of the three DASS scales consists of seven

items, with the Depression Scale focusing on the following domains: depression, hopelessness, self-criticism, lack of motivation, isolation from the outside world, anhedonia and helplessness. The Anxiety Scale focuses on the following main areas: the general state of activation and musculoskeletal effects. The Stress Scale focuses on specific chronic activation states such as difficulty relaxing, irritability, and impatience. The DASS scale distinguishes between the following severity zones: Normal, Mild, Moderate, Severe, and Very Severe (Lovibond & Lovibond, 1995). In this research, we also used the Hungarian shortened version (Szabó, 2010).

The sleeping disorder was measured using the Hungarian version of the Athens Insomnia Scale (AIS) (Novák et al., 2004). The questionnaire is an eight-question scale, five measuring nocturnal symptoms (difficulty falling asleep and staying asleep, early awakening) and three asking about daytime consequences. The higher the score, the worse the sleep quality (up to 24 points). At 10 points, the questionnaire indicates a clinically significant sleeping disorder (Soldatos et al., 2003).

To measure burnout, the Hungarian shortened version of the Oldenburg Burnout Inventory (MOLBI) was used (Adam et al., 2020). The questionnaire measures burnout along two dimensions: exhaustion measures work-related fatigue and the emotional, cognitive and physical strain of work, and the disengagement scale measures loss of interest in work, job depersonalisation, loss of commitment and possible cynicism. The MOLBI contains ten items, with 5 to 5 items for each of the two subscales. Half of the items are reversed, and responses are scored on a four-point Likert scale, with burnout indicated by high scores on the two subscales. The outcome variable used for statistical analyses was a categorical variable derived from the Mini Oldenburg

Burnout Questionnaire score, which indicates whether or not a person has burnout. As a comparison, based on the suggestion of Peterson et al. (2008) (mean of the responses of the exhaustion dimension ≥ 2.25 ; mean of the responses of the disengagement dimension ≥ 2.1), we calculated the number of persons and the percentage of persons in each subsample who fell into the burnout range.

To measure work stress, we used the abbreviated Effort-Reward Imbalance Questionnaire developed by Siegrist et al. (2004) and validated in Hungarian language by Salavecz et al. (2006). The questionnaire consists of three main dimensions: work effort, work rewards and overcommitment. The effort dimension of the abbreviated measure consists of three items, which ask about time pressure at work, interruptions, distractions, and increasing effort. The reward scale consists of six items. The questions relate to recognition for work, opportunity for advancement, job security, and adverse changes in the workplace. Respondents are asked to rate the questions on a five-point Likert scale. The effort scale is scored from 3 to 15, and the reward scale is scored from 6 to 30. For the effort scale, the higher the score, the more perceived effort; for the reward scale, the lower the score, the less perceived reward. The third dimension of the questionnaire, overcommitment, reflects the individual characteristics of the person in work situations. The overcommitment scale measures the ability to withdraw from work, overwork, using six items, scoring from 6 to 24, where a higher score indicates higher overcommitment of the employee (Siegrist, 2004; Salavecz, 2006).

Data were processed using IBM SPSS 28. We checked the reliabilities of the questionnaires on the sample tested by calculating Cronbach's Alpha, which was found to be adequate for all questionnaires

(Cr α DASS: 0.82 - 0.86; Cr α AIS: 0.87; Cr α MOLBI: 0.78-0.79; Cr α ERIQ: 0.68-0.87). Statistical tests were applied depending on the results of the Shapiro-Wilk normality test, Durbin-Watson auto-correlation test, collinearity and homoscedasticity diagnostics. The relationship between variables was tested by independent samples χ^2 , Mann-Whitney U test and (enter) linear regression analysis. To investigate which of the measured independent variables best predicted the two dimensions of burnout (Exhaustion and Disengagement), linear regression analysis was conducted. In addition to gender and age, we included in the model variables on marital status and number of children, housing conditions (own or rented), education and job characteristics (number of years working, second job, number of hours worked per week, home office availability), and health status (diabetes, hypertension, cardiovascular problems, chronic low back pain, headache/migraine, depression).

RESULTS

A total of 42 individuals (26 male, with an average age of 44.5 years (SD = 9.25) participated in the survey. Among them, 24 were married, 36 were homeowners (32 residing in urban areas), 24 were parents, and 35 held higher education degrees. Regarding work experience, 5 participants had 5 years or less, 15 had 5-10 years, 13 had 11-20 years, and 9 had over 20 years. Four individuals reported having a second job, 11 could work remotely from home, and 25 worked between 30 to 40 hours per week, while 17 participants worked fewer than 30 hours per week. In addition, among the participants, two workers reported suffering from diabetes, 10 from hypertension, 4 from cardiovascular disease, 13 from chronic pain, and 3 of them were diagnosed with depression. Table 1 illustrates the distribution of burnout as a function of gender. A total of 28 (10 male) individuals were found to be burnt out,

corresponding to 66.6% (95% CI = 0.52 - 0.82) of the sample.

Table 1. Gender distribution of burnout in our sample (n = 42).

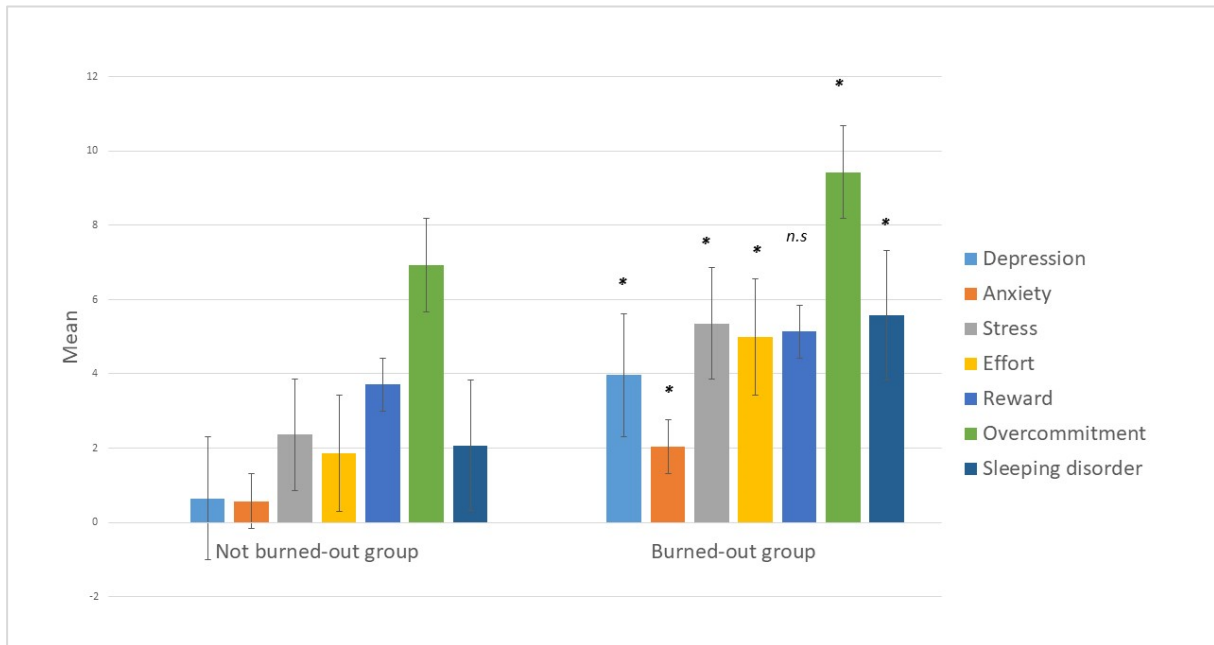
Burnout	Gender	Frequency	Percentage
No	Female	8	19,0 %
	Male	6	14,3 %
Yes	Female	18	42,9 %
	Male	10	23,8 %

We then used the Mann-Whitney U test to examine the differences between the burned-out and non-burned-out groups (Table 2. and Figure 1). The burned-out group showed significantly higher scores for nearly all variables. The burnout group showed more symptoms of depression (p = 0.01), anxiety (p = 0.01), stress (p = 0.01), effort (p = 0.006), overcommitment (p = 0.04) and sleep disturbance (p = 0.001) scored significantly higher. However, no difference was found between the two groups in subjectively experiencing work-related rewards (p = 0.15).

Table 2. Differences between the burned-out and not burned-out groups in the continuous variables tested (n = 42, *p < 0.05).

Burnout	Yes mean (SD)	No mean (SD)	Mann-Whitney U (Z)
Depression	3,96 (0,95)	0,64 (0,29)	100* (-2.67)
Anxiety	2,04 (0,41)	0,57 (0,17)	77* (-2.53)
Stress	5,36 (0,78)	2,36 (0,61)	100,5* (-2.57)
Effort	5 (0,69)	1,86 (0,53)	94,5* (-2.73)
Reward	5,14 (0,69)	3,71 (0,95)	141 (-1.48)
Overcommitment	9,43 (0,75)	6,93 (0,66)	118* (-2.09)
Sleeping disorder	5,57 (0,81)	2,07 (0,64)	77* (-3.204)

Figure 1. Differences between the burned-out and not burned-out groups in the continuous variables tested (n = 42, *p < 0.05). The error bars represent the 95% confidence intervals.



Independent samples χ^2 test was used to examine the differences between the burned-out and non-burned-out groups in terms of categorical variables (number of children, second job, home office, education, place of residence, having a dwelling as own property, single-parent family origin, marital status, hours worked per week, time spent working, diabetes, hypertension, cardiovascular disease, chronic back and waist pain, depression diagnosis) but probably due to the low sample size, no significant differences were found between the two groups.

Our results show that the model fitted to the Exhaustion dimension proved to be significant [F (20,21) = 2.11; p = 0.049, adj. R² = 0.35]. The type of residence (b = -0.41, t = -2.23, p = 0.037), the number of hours per week (b = 0.57, t = 3.63, p = 0.002), and diabetes (b = -0.45, t = -2.42, p = 0.03) were found to be significant predictors. Thus, the model suggests that workers who do not live in their own homes, work long hours and have diabetes are likely to have higher Exhaustion rates. No significant relationship was found for the other variables tested.

DISCUSSION

The results of our pilot study can provide important information on burnout among IT workers and how to predict it. The results suggest that overwork and overcommitment, negative affectivity and sleep problems are likely to play a role in the development and maintenance of burnout. Therefore, organisations and managers must take appropriate measures to protect workers' mental health, such as improving work-life balance, using stress management techniques, providing appropriate support such as mental health services or flexible working hours, and avoiding excessive workload expectations.

The workplace stress model underlying the Effort Reward Imbalance questionnaire used in our research is a good model of the interaction between individuals and organisations about burnout. According to this model, the resulting stress can lead to health impairment if the ratio of effort exerted at work to the rewards received is inadequate. Expecting reciprocity in line with social norms, employees receive

recognition and rewards for their efforts at work. Suppose this is not the case, and the worker has a low reward for high effort. In that case, this imbalance can contribute to the development of physical (e.g. cardiovascular) and psychological (e.g. burnout, depression) illnesses (Siegrist, 2004; Salavecz, 2006). Several studies have shown an increased risk of depression or burnout in workers with high reward-effort imbalance, with subjective experience of up to 70% in some occupations (Diekmann, 2020).

The exciting finding that diabetes may predict a more pronounced burnout dimension of exhaustion also indicates that the impact of workplace stress may affect mental health and physical well-being. Indeed, coping with certain chronic illnesses can hinder protection against burnout and even contribute to its development (Diekmann, 2020). This is why interventions are needed at the organisational level to improve health management in all occupational groups. For example, an occupational health management system could optimize both disease prevention and worker mental health.

A limitation of our pilot study is the small sample size, therefore, the study needs to be replicated and the results confirmed on a more representative sample. Furthermore, the study was exploratory and cross-sectional, therefore, it is not possible to follow the variables over time, which needs to be compensated by a longitudinal study in the future. However, the results of the pilot study presented here

offer the possibility to design and implement a study with a larger sample size. Finally, the research focused only on IT workers, so we cannot generalise the results to other professions or industries. Further research would benefit from extending the study to other professions and industries to understand how risk factors for burnout vary across other sectors. In addition, it would also be worthwhile to include other variables in the analysis, such as the role of different ways of coping with stress, peer and workplace support, or organisational culture, to get a more accurate picture of the development of burnout and the interaction between the individual and the organisation about burnout.

CONCLUSION

Overall, our research shows that burnout is a complex problem that can be influenced by many factors. Further research on a larger sample can help us gain a deeper understanding of how burnout develops and develop more effective prevention strategies. Therefore, this study's results can contribute to the theoretical knowledge on burnout and may also have important practical implications.

The research was carried out within the framework of the 2020-1.1.2-PIACI-KFI-2021-00306. "Okos Révkalauz HUB" project.

REFERENCES

- Ádám, S., Dombrádi, V., Mészáros, V., Bányai, G., Nistor, A., & Bíró, K. (2020). Az Oldenburg Kiegészítő Kérdőív és rövidített változatának összehasonlító elemzése. *Clinical Neuroscience/Ideggógyászati Szemle*, 73.
- Atouba, Y. (2021). How does participation impact IT workers' organisational commitment? Examining the mediating roles of internal communication adequacy, burnout and job satisfaction. *Leadership & Organization Development Journal*, 42(4), 580–592.
- Demerouti, E., & Bakker, A. B. (2011) The job demands-resources model: challenges for future research, *SA Journal of Industrial Psychology*, 37(2), 01–09.
- Diekmann, K., Böckelmann, I., Karlsen, H. R., Lux, A., & Thielmann, B. (2020). Effort-reward imbalance, mental health and burnout in occupational groups that face mental stress. *Journal of Occupational and Environmental Medicine*, 62(10), 847–852.
- Erős M, A., & Szabó, É. (2020). A kiegészítő és a munkahelyi értékelés összefüggései a versenyszférában. *Alkalmazott Pszichológia*, 20(3), 7–26.
- Freudenberger, H. J. (1975) The staff burn-out syndrome in alternative institutions. *Psychotherapy: Theory, Research & Practice*, 12.1:73.
- Kim, S. (2012). The impact of human resource management on state government IT employee turnover intentions. *Public Personnel Management*, 41(2), 257–279.
- Koutsimani, P., Montgomery, A., & Georganta, K. (2019). The relationship between burnout, depression, and anxiety: A systematic review and meta-analysis. *Frontiers in Psychology*, 10, 284.
- Leiter, M. P. (1991). Coping patterns as predictors of burnout: The function of control and escapist coping patterns, *Journal of Organizational Behavior*, 12(2), 123–144.
- Lovibond, P. F., & Lovibond, S. H. (1995) The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories, *Behaviour research and therapy*, 33(3), 335–343.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2011) Job burnout. *Annual review of psychology*, 52(1), 397–422.
- Novak, M., Mucsi, I., Shapiro, C. M., Rethelyi, J., & Kopp, M. S. (2004). Increased utilization of health services by insomniacs—an epidemiological perspective. *Journal of psychosomatic research*, 56(5), 527–536.
- Peterson, U., Demerouti, E., Bergström, G., Åsberg, M., & Nygren, Å. (2008). Work characteristics and sickness absence in burnout and nonburnout groups: a study of Swedish health care workers. *International Journal of stress management*, 15(2), 153.
- Porter, G. (1996) Organizational impact of workaholicism: suggestions for researching the negative outcomes of excessive work. *Journal of occupational health psychology*, 1.1:70.
- Poulose, B. (2023) Study of burnout and Turnover Intention Among IT Sector Employees with Reference to work from Home during Pandemic Available at SSRN 4430176.
- Salavecz, G., Neculai, K., Rózsa, S., & Kopp, M. (2006). Az Erőfeszítés-Jutalom Egyensúlytalanság Kérdőív magyar változatának megbízhatósága és érvényessége. *Mentálhigiéné és Pszichoszomatika*, 7(3), 231–246.
- Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies*, 3, 71–92.
- Siegrist, J., Starke, D., Chandola, T., Godin, I., Marmot, M., Niedhammer, I., & Peter, R. (2004). The measurement of effort-reward imbalance at work: European comparisons. *Social science & medicine*, 58(8), 1483–1499.
- Soldatos, C. R., Dikeos, D. G., & Paparrigopoulos, T. J. (2003). The diagnostic validity of the Athens Insomnia Scale, *Journal of psychosomatic research*, 55(3), 263–267.
- Szabó, M. (2010) The short version of the Depression Anxiety Stress Scales (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence*, 33(1), 1–8.

INFORMÁCIÓK A SZERZŐKRŐL

Gács Boróka

University of Pécs, Medical School, Institute of Behavioural Sciences, Pécs
boroka.gacs@aok.pte.hu

Matuz András

University of Pécs, Medical School, Institute of Behavioural Sciences, Pécs
andras.matuz@aok.pte.hu

Fehér Gergely

University of Pécs, Medical School, Centre for Occupational Medicine, Pécs
gergely.feher@aok.pte.hu

Tibold Antal

University of Pécs, Medical School, Centre for Occupational Medicine, Pécs
tibold.antal@pte.hu

Kapus Krisztián

University of Pécs, Medical School, Centre for Occupational Medicine, Pécs
kapusk@gmail.com

Bankó Zoltán

University of Pécs, Faculty of Law and Political Sciences, ELKH-PTE-NKE Research Group on Comparative and European Employment Policy and Labour Law, Pécs
banko.zoltan@ajk.pte.hu

Berke Gyula

University of Pécs, Faculty of Law and Political Sciences, ELKH-PTE-NKE Research Group on Comparative and European Employment Policy and Labour Law
berke.gyula@ajk.pte.hu

CIKKINFORMÁCIÓK

Beküldve: 2023. 07. 12.

Elfogadva: 2023. 10. 16.

Megjelentetve: 2023. 12. 15.

Copyright © 2023. Gács Boróka, Matuz András, Fehér Gergely, Tibold Antal, Kapus Krisztián, Bankó Zoltán, Berke Gyula. Kiadó: Magyar Népegészségügy Megújításáért Egyesület. Ez egy nyílt hozzáférésű cikk a CC-BY-SA-4.0 licenstszerződés alapján.