The characteristics of burnout syndrome among healthcare professionals before and during the COVID-19 pandemic

Summary of Ph.D. Thesis

Mona Stankovic, M.A.

Doctoral School of Clinical Medicine

Department of Emergency Medicine

Albert Szent-Györgyi Clinical Centre

University of Szeged

Supervisors: Annamária Töreki, M.A., Ph.D.

Zoltán Pető, M.D., Ph.D., D.E.A.A.

Szeged

2022

Original research articles related to the thesis:

I. **Stankovic, M.,** Papp, L., Ivánkovits, L., Lázár, Gy., Pető, Z., Töreki, A. (2022). Psychological immune competency predicts burnout syndrome among the high-risk healthcare staff: a cross-sectional study. *International Emergency Nursing Journal*, *60*:101114 DOI: 10.1016/j.ienj.2021.101114. IF 2020: 2.142; SRJ indicator: Q1

II. **Stankovic, M.,** Papp, L., Nyúl, B., Ivánkovits, L., Pető, Z., Töreki, A. (2021). Adaptation and psychometric evaluation of Hungarian version of the Fear of COVID-19 Scale. *PLOS ONE*, *16*(12): e0261745. DOI: 10.1371/journal.pone.0261745. IF 2020: 3.24; SRJ indicator: D1

III. **Stankovic, M.,** Jagodics-Varga, L., Babik, B., Pető, Z., Töreki, A. (2020). A kiégésszindróma vizsgálata a Szegedi Tudományegyetem Aneszteziológiai és Intenzív Terápiás Intézet dolgozói körében. *Nővér*, *33*(6), 11–17.

IV. **Stankovic, M.,** Töreki, A., Lázár, Gy., Pető, Z. (2019). A kiégésszindróma vizsgálata a Szegedi Tudományegyetem Sebészeti Klinikájának dolgozói körében és összehasonlítása a Sürgősségi Betegellátó Önálló Osztályon kapott eredményekkel. *Orvosi Hetilap, 160*(20), 784–791. IF: 0.497; SRJ indikátor: Q3

Cumulative impact factor of the original papers related to the thesis: 5.879

List of abbreviations

BDI-H – Shortened Beck Depression Inventory – Hungarian version

CFA – Confirmatory Factor Analysis

CFI – Comparative Fit Index

COVID-19 – Coronavirus, SARS-CoV-2 virus

FCV-19S – Fear of COVID-19 Scale

IQR – Interquartile Range

RMSEA – Root Mean Square Error of Approximation

SRMR – Standardized Root Mean Square Residual

STAI – State-Trait Anxiety Inventory

TLI – Tucker-Lewis Index

1. Introduction

1.1. Burnout syndrome as a potential consequence of workplace stress

Burnout syndrome has become more and more relevant in the lighting of present circumstances. The spectra of new stressors introduced by the coronavirus pandemic has significantly extended the everyday occupational hardships of clinical workers as well as the severity and prevalence of burnout syndrome.

Burnout is a syndrome of emotional, mental and cognitive exhaustion. It is caused by prolonged chronic stressors at work that result in emotional exhaustion, depersonalization, and a sense of inefficacy, decrease in personal accomplishment (Maslach, 2003; Maslach et al., 2001). Emotional exhaustion is the most important indicator of personal burnout, characterized by depletion of psychological and emotional resources, negative attitudes towards work and life, fatigue, loss of energy, resistance to work and feeling of purposelessness (Győrffy & Ádám, 2004). Depersonalization is a social component defined by detachment, cynicism, negative response to the various aspects of a job, impersonal attitude in relationships with others, associated with negative emotions. Personal accomplishment dimension describes the relationship between a person and their work, one's assessment of their own work performance (Maslach et al., 2001).

1.2. Symptoms of burnout syndrome

Even though burnout syndrome is defined as an occupational phenomenon, it effects various aspects of our lives. It has typical somatic, cognitive, affective and behavioral symptoms. Exhaustion, fatigue, loss of energy, insomnia, loss of libido, indigestion, headache, chest pains can all be somatic symptoms associated with burnout (De Hert, 2020). Burnout syndrome is connected to several cognitive symptoms as well, such as difficulties in decision making, decreased performance, inefficiency, decrease in self-esteem and negative attitude toward self and work. It is also coupled with feelings of time pressure, indispensability, helplessness. Frequent mood swings, irritability, nervousness and anger, impatience and dissatisfaction, sense of internal emptiness and loss of control are all common feelings associated with burnout. Finally, hyperactivity followed by decreased performance, avoidance behaviors, decreased creativity, rigidity and addictive behaviors (alcohol consumption, smoking) strongly correlate with burnout (West et al., 2018).

1.3. Burnout syndrome among healthcare professionals

The prevalence of burnout syndrome among the helping professions seems to be higher than among other occupations (Maslach et al., 2001; Ádám & Mészáros, 2012). Healthcare professionals are dealing with complex interpersonal situations, caring for patients in critical conditions, performing various medical procedures with absolute precision, completing complex tasks under time pressure, responding accurately and quickly to extremely urgent situations, mastering intensive use of sophisticated technology (Schaufeli et al., 2008; West et al., 2018). These high expectations are frequently coupled with working circumstances that allow very limited control, such as the development of new skillsets, influence over workflows and decision-making power. Such organizational characteristics provide ideal conditions for burnout (Bakker et al., 2005; Karasek, 1979). Physicians are not only at a greater risk of developing mental illness and stress-related problems, but can also be more susceptible to depression as well as alcohol and drug abuse (Dubey & Shahi, 2011).

1.4. Coping with workplace stress: the concept of psychological immune competency

In order to better understand the interactional nature of coping mechanisms manifesting during successful adaptation, Oláh has conceptualized and operationalized the construct of a psychological immune system as a pool of psychological adaptive resources providing protection against the ill effects of stress (Oláh, 2005).

The psychological immune system is a concept designed to reveal the interactions manifested during successful adaptation, an integration of coping skills into a multidimensional complex network providing capabilities for adequate adaptation and stress-management, strengthening invulnerability and raising the coping capacity of individuals (Nagy & Nagy, 2016). Most importantly, psychological immunity ensures the integrated functioning of the personality and facilitates development and self-growth (Oláh, 2005; Vargay et al., 2019). People with stronger psychological immune competence tend to be more adaptable to a changing environment and newly emerging stressors, also, they tend to report higher well-being and life-satisfaction, environmental mastery, purpose in life, personal growth, self-acceptance, positive relations and autonomy (Vargay et al., 2019). A stronger psychological immune competency might be of paramount importance for the management of burnout among clinical professionals, as general practitioners with higher psychological immunity measure lower levels of burnout on all three scales (Dubey & Shahi, 2011).

1.5. Effects of the COVID-19 pandemic on healthcare workers, fear of coronavirus

The spread of coronavirus triggered feelings of depression, fear, stress and anxiety among the general population as well as healthcare professionals (Rajabimajd et al., 2021). The long-term effects of the COVID-19 related fear are connected to decreased job satisfaction and performance as well as high levels of anxiety among healthcare personnel (Rajabimajd et al., 2021). The burdens of the pandemic, such as social distancing, lockdown, quarantine or isolation (Kato et al., 2020), the long-term consequences, such as job loss, financial insecurities, disruption of daily activities (Galea et al., 2020), together with the overestimation of death tolls as well as sensationalistic news and broadcasting all amplify fears and often generate stigma (Lin, 2020; Soraci et al., 2020). To date there is no particular estimation as to the duration of the pandemic, which further deepens feelings of uncertainty (Haktanir et al., 2020).

Negative psychosocial consequences of fear have been reported during former epidemics, establishing that people often oscillate between denial and phobia, while stigmatizing individuals racially perceived as being the source of the infection (Amin, 2020). Fear is often accompanied with feelings of anxiety and depression, which adds on to the negative impact on one's well-being and quality of life (Ford et al., 2019; Soraci et al., 2020).

Several measures have been created in order to assess the effects of coronavirus on mental health (Ransing et al., 2020). Ahorsu et al. recently developed the Fear of COVID-19 Scale (FCV-19S), a measure adequate for the assessment of the fear of coronavirus (Ahorsu et al., 2020). This seven-item scale is a short and easy-to-use tool with very good internal consistency and concurrent validity positively correlating with measures of anxiety and depression (Winter et al., 2020).

Complementing medical treatments of coronavirus patients (regardless of whether they are healthcare professionals or not) with psychological interventions would result in better-quality patientcare and an overall better outcome for the entire population affected (Soraci et al., 2020). Adaptation of the FCV-19S to Hungarian ensures healthcare providers with a useful tool when in need of quickly assessing an individual's fear of coronavirus (Ahorsu et al., 2020; Pakpour et al., 2020). With a scale capable of assessing the fear of COVID-19 we are able to map out the correlation between the fear of the infection, burnout, anxiety and depression among healthcare professionals working in COVID-19 facilities as well as in traditional medical fields.

2. Aims and objectives

Our primary aim was to assess the prevalence of burnout syndrome among the healthcare professionals at the University of Szeged, Albert Szent-Györgyi Clinical Centre. We attempted to understand how individual factors, such as the strength of psychological immune competency, the strength and width of perceived social support, the somatic symptoms and demographics effect burnout. The main goal of the initial study was to clarify which psychosocial factors have an impact on burnout syndrome with an explicit intention to develop novel intervention strategies for healthcare professionals, particularly for the employees of critical care fields.

After the onset of the COVID-19 pandemic we aimed to better understand the everyday hardships of the employees of the Department of Emergency Medicine through qualitative interviews. With this study our goal was to set up new hypotheses for further burnout research in a vastly changed healthcare environment.

The fear of coronavirus appeared as a recurrent topic in the interviews analyzed in the second study. Responding to this result, we aimed to adapt to Hungarian and validate a tool adequate for its measurement: the FCV-19S. Having a novel tool focusing specifically on the measurement of the fear of coronavirus enables us to measure its effect on burnout as well as assess patients currently under care.

Finally, we compared the levels of burnout originally measured with results collected during the coronavirus pandemic among critical care workers. In this last study, in addition to burnout results, we present data regarding the fear of COVID-19, but also levels of depression and anxiety. The objective of this study was to compare the initial characteristics of burnout syndrome to those perceived during the pandemic as well as to get a more coherent picture of the mental health status of the healthcare professionals during the epidemic.

3. Methods and materials

3.1. STUDY 1: Systematic burnout measurement with the aim of developing interventions

Participants were recruited from 11 different clinics of the University of Szeged. 568 questionnaires were collected by the designated deadlines. A test battery was created consisting of basic socio-demographic questions including inquiries regarding somatic symptoms and complaints. A modified Hungarian adaptation of the Caldwell Support Dimension Scale (Caldwell et al., 1987; Kopp & Kovács, 2006) was used to determine the

strength and diversity of social relationships. Burnout was measured using the Maslach Burnout Inventory (Maslach et al., 1996) and psychological immunity was measured using the Psychological Immune Competency Questionnaire (Oláh, 2005). Lastly, three qualitative questions were asked: *How do you protect yourself against burnout syndrome?*, *What do you like about your job?* and *What measures should your employer implement in order to prevent burnout?*.

The data collection began in 2017 and was stopped in March 2020 with the outbreak of the COVID-19 epidemic in Hungary. We decided to end this line of research as the change in the organizational environment was very significant, and the data prior to the pandemic would have no longer been comparable to the data collected after these changes.

3.2. STUDY 2: Finding new focus due to the COVID-19 pandemic – a qualitative study

In March 2020 the coronavirus pandemic has significantly changed the healthcare environment. The newly introduced stressors made it difficult for us to find a clear course for further work. Due to this loss in objective, we have decided to conduct a qualitative study in order to generate new hypotheses and research questions for forthcoming studies. It was our aim to analyze the newly emerging needs, attitudes and beliefs of healthcare professionals during the pandemic in order to gain ideas for later original studies.

Thirteen employees (two doctors and eleven nurses) of the Department of Emergency Medicine were recruited. The interviews were semi-structured, starting with an initial question: *"Please tell me your story starting when you realized that there is coronavirus epidemic in Hungary."*. The interview guide focused on drawing out the individual's perception of stressful situations at work, specifically in regard to the coronavirus pandemic and the coping strategies they used when exposed to occupational stressors. The interviews were audio-recorded, then transcribed and anonymized, and these texts were further used during the data analysis.

Interviews were examined using the content analysis. We broke down the interview texts into words, phrases or larger pieces of raw data, and looked for common denominators. Our aim in this study was not to extract as many codes and categories as possible and get as clear of a picture as possible, but rather to find a new orientation and obtain a new direction of research. For this reason, we stopped the data analysis as soon as we found our new inquiry.

3.3. STUDY 3: Validation of the FCV-19S

Participants were a convenience sample of employees and students of the University of Szeged. A final sample comprising of 2175 participants was used to validate the Hungarian version of the FCV-19S. Adaptation was carried out in accordance with the Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures (Beaton et al., 2001). The forward-backward translation method was applied to adapt the FCV-19S into Hungarian.

The FCV-19S is a unidimensional, 7-item scale that measures one's levels of fear of coronavirus (Ahorsu et al., 2020). In the Hungarian adaptation of the scale, we have decided to use a four-point Likert scale for the ease of use with the rest of the measures. The Hungarian adaptation (Sipos et al., 1978) of the State-Trait Anxiety Inventory (STAI) questionnaire was used to assess participants' state anxiety (Spielberger et al., 1983). Level of depression among participants was assessed using the shortened Hungarian version (Kopp, 2007) of the Beck Depression Inventory (BDI-H) (Beck & Beck, 1972).

Internal consistency was assessed by Cronbach's alpha coefficient and corrected item-total correlations. Concurrent validity was assessed by comparing the Spearman correlations between the FCV-19S, the STAI and the BDI-H results. A confirmatory factor analysis (CFA) was performed to investigate the proposed theoretical domain structure in the Hungarian sample using the mean- and variance-adjusted weighted least squares estimator. Goodness of fit was assessed according to the following criteria: root mean square error of approximation (RMSEA $\leq$ 0.08); comparative fit index (CFI > 0.90 or more desirably $\geq$ 0.95); Tucker–Lewis index (TLI > 0.90); standardized root mean square residual (SRMR < 0.08 or more desirably < 0.05) and chi-square. To test for measurement invariance across gender, multiple group CFA analysis was performed. Configural, metric and scalar invariance was examined, invariance was established if ΔCFI and ΔTLI $\leq -$ 0.01; ΔRMSEA < 0.015.

3.4. STUDY 4: Comparison of burnout results before and during the COVID-19 pandemic among critical care physicians and nurses

Participants were the employees of the Department of Emergency Medicine, the Department of Anaesthesiology and Intensive Therapy and the Department of Surgery. 216 physicians and nurses were recruited in the initial measurement which was conducted in 2018 and 2019 using the test battery previously described in 3.1. In the summer of 2021, during the COVID-19 pandemic we conducted the second measure. In total 124 employees took part

in the second survey. The new test battery consisted of demographic questions followed by the Maslach Burnout Inventory and the FCV-19S validated in the previous study of this work (see 3.3.). The test battery continued with the STAI and finally the BDI-H.

4. Results

4.1. STUDY 1: Systematic burnout measurement with the aim of developing interventions

The summary of the thesis contains only the most significant statistical analyses focusing mainly on burnout results. 66% of the sample showed at least moderate emotional exhaustion (n = 376), 35% moderate or high depersonalization (n = 196), while 73% decline of personal accomplishment (n = 412). 20% of the participants (n = 111) measured at least moderate burnout, while 5% (n = 30) were highly burnt out on all three scales. The median on emotional exhaustion was 24 points ($IQR = 14 - 34$), on depersonalization 6 points ($IQR = 2 - 12$), while on personal accomplishment 38 points ($IQR = 43 - 31$). The emotional exhaustion falls within the moderate category, while depersonalization and personal accomplishment are on the border between low and moderate (Maslach et al., 1996).

Age seemed to be inversely proportional with burnout: older test subjects showed lower levels of emotional exhaustion ($r = -0.156$; $p < 0.001$), depersonalization ($r = -0.231$; $p < 0.001$) and less decline in personal accomplishment ($r = 0.115$; $p = 0.009$). Participants with children were significantly less depersonalized ($p < 0.001$), emotionally exhausted ($p = 0.003$), and showed a tendency for higher personal accomplishment ($p = 0.079$). Employees reporting somatic symptoms also reported higher levels of emotional exhaustion ($p = 0,011$), depersonalization ($p < 0.001$) and loss of personal accomplishment ($p = 0,049$). Lastly, the level of perceived social support correlated significantly with all three scales of burnout: emotional exhaustion ($r = -0.204$; $p < 0.001$), depersonalization ($r = -0.171$; $p < 0.001$) and personal accomplishment ($r = 0.217$; $p < 0.001$).

The correlation between the results on the Maslach Burnout Inventory and the total value of the psychological immune system was significant on the scale of emotional exhaustion ($r = -0.490$; $p < 0.001$), depersonalization ($r = -0.380$; $p < 0.001$) and personal accomplishment ($r = 0.573$; $p < 0.001$). Between results of mildly and highly burnt out subsamples, the following eight scales of psychological immunity showed significant difference ($p < 0,05$): positive thinking, sense of coherence, sense of self-growth, goal orientation, synchronicity, impulse control, emotional control and irritability control.

4.2. STUDY 2: Content analysis of qualitative data with an aim to find new direction in research

The aim of the content analysis of the semi-structured interviews was to generate new research questions and hypotheses for further studies. Several topics have emerged during the content analysis, however, the concept of fear arose effecting multiple aspects of participants' life. Notion of fear was present in most of the interviews, and was reappearing within interviews in regard to different subject matters. Upon the analysis we have decided to look for novel tools that somehow try to conceptualize the feeling of fear in the unconventional environment generated by the pandemic. We have selected the FCV-19S (Ahorsu et al., 2020) and decided to validate the instrument in Hungarian.

4.3. STUDY 3: Validation and psychometric analysis of the Hungarian FCV-19S

In total 2175 participants completed the survey: 1786 students and 390 employees. The Cronbach's alpha value for the Hungarian FCV-19S was 0.839. The corrected item-total correlations varied between 0.59 and 0.68. Concurrent validity was supported by the significant correlations with the STAI ($r = 0.402$; $p < 0.001$) and the BDI-H ($r = 0.270$; $p < 0.001$).

CFA was performed on the data based on the factor structure provided in the original study (Ahorsu et al., 2020). A first order CFA was run to determine whether the factor structure of the original form of the scale would be confirmed in the Hungarian sample. The first model of the CFA revealed a poor fit for the seven-item single-factor construct. The pattern of modification and inter-item correlations suggested the presence of notable error co-variance within the cluster of items #1 (I am most afraid of coronavirus-19) and #2 (It makes me uncomfortable to think about coronavirus-19), #1 and #4 (I am afraid of losing my life because of coronavirus-19) and #2 and #5 (When watching news and stories about coronavirus-19 on social media, I become nervous or anxious). When the error of variance of these items was correlated in the Model 2, the above-mentioned values decreased substantially, and were below the required cut-off values. In the second model the goodness of fit values suggested a good fit and were the following: RMSEA = 0.089, CFI = 0.956, TLI = 0.932. Factor loadings of the items tested with CFA were found as I1 = 0.55, I2 = 0.47, I3 = 0.77, I4 = 0.63 I5 = 0.58, I6 = 0.82, I7 = 0.84.

To test for measurement invariance across gender, multiple group CFA analyses was performed. The results showed a good fit for the model in both male (N = 836, $\chi^2 = 65.972$, df = 11, RMSEA = 0.077, CFI = 0.983, TLI = 0.967, SRMR = 0.029) and female (N = 1339,

$\chi^2 = 134.768$, df = 11, RMSEA = 0.092, CFI = 0.967, TLI = 0.937, SRMR = 0.038) groups. The criteria for configural invariance (one-factor structure) were met. The comparison of the relative fit of the nested models showed that the criteria for metric invariance were also met, but not for the scalar invariance.

4.4. STUDY 4: Comparison of burnout results before and during COVID-19 pandemic among critical care physicians and nurses

28% of the sample showed at least moderate burnout on all three scales, while 5% of participants were highly burnt out. 66% of the sample showed at least moderate emotional exhaustion, 47% moderate depersonalization, while 50% of participants admitted to at least moderate decline in personal accomplishment.

In order to identify which significant variables predicted the levels of burnout in this specific sample of healthcare workers, multiple regression was employed. The best predictor of emotional exhaustion was psychological immune competency, followed by the level of education and the number of children (adjusted $R^2 = 0.341$). The best predictor of depersonalization (adjusted $R^2 = 0.312$) was also the strength of psychological immune competency, followed by the number of children and level of education, while personal accomplishment (adjusted $R^2 = 0.347$) was best predicted by the strength of psychological immune competency and age.

124 critical care employees took part in the second survey. 79% of participants showed at least moderate burnout on all three scales, while 40% were highly burnt out. The median on the emotional exhaustion scale was 38.5 points (*IQR = 31 – 46.8*), on the depersonalization scale 15.5 points (*IQR = 9 – 21*), while on the personal accomplishment scale 44 points (*IQR = 49 – 38*). All three results fall into the high category.

Fear of COVID-19 correlated significantly with all three scales of burnout: emotional exhaustion (r = 0.280; p = 0.002), depersonalization (r = 0.223; p = 0.013), and personal accomplishment (r = -0.232; p = 0.010). Levels of state anxiety showed significant positive correlation with the personal accomplishment scale (r = 0.181; 0.044), meaning that individuals with higher levels of state anxiety perceive their personal accomplishment as better. 89% of the sample (n = 110) reported at least low levels of depression, 21% reported moderate depression (n = 26). Levels of depression correlated significantly with all three scales of burnout: emotional exhaustion (r = 0.685; p <0.001), depersonalization (r = 0.539, p < 0.001) and personal accomplishment

(r = -0.472; p = 0.001). There was a significant difference (p < 0.001) between means reached during the first and second measurement on all three scales of burnout.

5. Discussion

5.1. Discussion of the initial burnout results

In the introductory study carried out before the pandemic, participants exhibited moderate emotional exhaustion and moderate-low depersonalization and loss of personal accomplishment. These findings are similar to previous studies and regional results (Balan et al., 2019; Cubrilo-Turek et al., 2006; Petrelli et al., 2019).

Burnout syndrome is more prevalent among healthcare workers with lower psychological immune competency. Psychological immune competency is a construct encapsulating coping strategies, whose strength and diversity predict the success of one's adaptation. These results support the theory according to which more adequate coping strategies and a higher degree of resilience contribute to the proper management of increased work-related stress and limit burnout (Győrffy, 2019; Mészáros et al., 2013). In concordance with the previous results, we found the strength of psychological immune competency to be a stable predictor of an individual's burnout (Dubey & Shahi, 2011; Oláh, 2005).

Workers reporting higher number and better-quality social relationships also report lower levels of burnout. The stability, diversity and width of one's social network seems to be an important protective factor against all three scales of burnout (Rippstein-Leuenberger et al., 2017). According to our results, burnout syndrome is less prevalent with age, older test subjects report lower levels of burnout, similarly to some previous studies (Shanafelt et al., 2009, 2012). Additionally, colleagues who have spent longer times in healthcare and longer times in their respective fields also report lower burnout. This supports the notion that with time coping mechanisms can be developed and professional confidence can be gained which helps us navigate through workplace stressors and prevent burnout. It also supports the theory that psychological immunity can be developed and advanced with time, so investing in such practices could be a successful prevention strategy.

As a part of this study a three-part intervention program was developed and implemented at the Department of Emergency Medicine, the Department of Surgery, the Department of Ophthalmology and the Department of Anaesthesiology and Intensive Therapy. The training sessions were held in groups with a maximum of 10 participants. They were approximately two hours long, and the first focused on psychoeducation on burnout, the second

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on communication and the third on aggression and impulsivity. The trainings stopped as the COVID-19 pandemic started, so we were unable to fine tune them, and measure their effect.

5.2. Discussion of the validation of the FCV-19S

The primary aim of this study was to examine psychometric properties of the Hungarian FCV-19S. Results suggest that the Hungarian version of the scale has a stable unidimensional structure, equally to the original (Ahorsu et al., 2020). Across a large sample, the Hungarian FCV-19S has good internal reliability and consistency.

The significant correlation between the FCV-19S, the STAI (level of state anxiety) and the BDI-H (level of depression) confirms the concurrent validity of the scale. Similar correlations between the FCV-19S and the STAI have been formerly reported on the sample of Spanish university students (Martínez-Lorca et al., 2020). Anxiety and depression are often comorbid with feelings of fear, specifically fear during epidemics (Blakey et al., 2015). This relationship has been reported in several adaptations of the scale (Soraci et al., 2020) using various measures of anxiety and depression all reporting significant positive correlation between the scales (Martínez-Lorca et al., 2020; Perz et al., 2020; Soraci et al., 2020).

The significant positive relationship measured between levels of fear and levels of state anxiety and depression, suggest that individuals who experience high levels of fear of coronavirus have also high probability to comorbidly be affected by these disorders (Soraci et al., 2020). This supports previous findings reporting that long periods of infectious epidemics are a breeding ground for development of psychophysical health issues and negative mental health conditions such as feelings of depression, anxiety, fear and phobias (Blakey et al., 2015; Soraci et al., 2020). Higher scores on the FCV-19S predict higher scores on the STAI and the BDI-H, however, even though significant, the correlations between the FCV-19S and the STAI and between the FCV-19S and the BDI-H were moderate. This indicates a significant unshared variance between the FCV-19S, the STAI and the BDI-H suggesting that they represent more than one underlying construct, thus the FCV-19S may provide some unique variance to the construct of overall anxiety and depression (Perz et al., 2020).

The effect of the COVID-19 pandemic is not exclusively physical and psychological, but it raises severe systematic, social and economic issues. For instance, the spread of a viral infection is strongly in connection with the burden placed on the healthcare system and its possible overload (Rajabimajd et al., 2021) which negatively effects the healthcare professionals as well as the general population. Insecurity regarding the stability

of the nation's healthcare system (Soraci et al., 2020) increases stress levels among all citizens, which in turn can have a negative effect on both physical and mental health (Hamm, 2020).

The Hungarian version of the FCV-19S enables future research on causes and consequences of the fear of coronavirus and its effect on behaviors in connection to the pandemic. Secondly, it can be a direct tool used by the staff working in COVID-19 inpatient facilities for assessment of coronavirus-specific fear among patients.

5.3. Comparison of the burnout results prior to and during the COVID-19 pandemic

In the final study of the thesis, we have remeasured levels of burnout among critical care employees, additionally, we have measured their fear of coronavirus, levels of depression and state anxiety. Lastly, we compared the levels of critical care workers' burnout collected before and during the global epidemic of coronavirus.

The prevalence of burnout has significantly risen, almost 80% of the sample show at least moderate burnout on all three scales, while 40% report high levels of burnout compared to previously measured 5%. Interestingly, emergency and intensive care employees perceive their personal accomplishment as better during the pandemic compared to pre-pandemic levels.

The fear of coronavirus shows a significant positive correlation with burnout meaning that colleagues who experience higher levels of fear about the pandemic and their own safety are also more likely to burn out. The significant positive correlation between levels of fear and levels of state anxiety and depression suggests that individuals who experience high levels of fear of the coronavirus also have a high probability to be comorbidly affected by depression and anxiety (Blakey et al., 2015; Soraci et al., 2020). A similar connection is found between burnout and depression. Employees reporting higher levels of burnout declare higher levels of depression as well (Wurm et al., 2016). Interestingly, participants effected with state anxiety report higher levels of personal accomplishment, meaning that they perceive their work as being better.

6. Conclusion and main findings

Burnout syndrome has been prevalent among healthcare professionals, mainly among critical care workers, prior to pandemic; however, with the new stressors being introduced by the epidemic of coronavirus, the situation became even more complex. The

importance of present thesis primarily lies in the systematic measurement of burnout syndrome at the Albert Szent-Györgyi Clinical Centre, reaching out to all workers with a focus on mapping out protective and risk factors that can be used as building blocks of novel intervention and prevention strategies. To our knowledge, this is the first such study in Hungary. We have defined eight scales of psychological immune competency that significantly influence burnout. The emphasis of our work is in the utilization of the acquired knowledge through intervention trainings, which should be implemented again as soon as gatherings within healthcare institutions become acceptable.

After the outbreak of the COVID-19 pandemic, we have looked for novel directions in our research, relying on the qualitative study, and have introduced the concept of the fear of coronavirus. The novelty of our research is in the validation of the FCV-19S in Hungarian.

Lastly, we have compared burnout results before and during the pandemic among critical care physicians and nurses and have measured their fear of COVID-19, state anxiety and depression. We have found the fear of COVID-19 and depression to have a positive correlation with burnout, but not state anxiety. The prevalence of depression and its correlation with burnout is extremely important, as it has an overall effect on the critical care employees' life, the quality of their relationships, their well-being, their mental and physical health.

7. Acknowledgements

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