RESEARCH ARTICLE

The relationship between physical activity and burnout among respiratory therapists in Jeddah City, Saudi Arabia

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Background/objective: Burnout is a condition in which a person feels physically fatigued and mentally drained. It occurs after a long period of work-related stress and may lead to mental disorders, such as depression and anxiety. Therefore, healthcare providers especially require early intervention. Regular physical activity has been reported to benefit individuals with mental illness, suggesting that a relationship between physical activity and burnout might exist. Hence, this study's objective was to analyze the relationship between physical activity and burnout among respiratory therapists and student interns in Jeddah City, Saudi Arabia.

Methods: A cross-sectional descriptive study with respiratory therapists and interns working in public and private hospitals was conducted from November 2, 2020, to November 27, 2020. Participants responded to an electronic survey consisting of the Maslach Burnout Inventory – Human Services Survey for Medical Personnel, which measures the burnout dimensions of emotional exhaustion, depersonalization, and personal accomplishment. They also completed the International Physical Activity Questionnaire – Long Form and a demographic questionnaire.

Results: Among the 250 eligible respiratory therapists and interns, data from the 152 respondents who completed the electronic survey were analyzed. Although no association between physical activity and burnout was found, a significant effect of the novel coronavirus disease 2019 (COVID-19) on physical activity and significant associations of high burnout (emotional exhaustion) with nationality and smoking were found.

Conclusion: No association was found between burnout level and physical activity. Confounding factors, such as the COVID-19 pandemic during the study's data collection and analyses, likely contributed to the study's findings.

Key Words: *professional burnout; exercise; respiratory therapists; Maslach Burnout Inventory; International Physical Activity Questionnaire*

INTRODUCTION

State of mind plays a major role in work productivity and efficiency. Burnout has been described as a consequence of severe stress in the workplace that affects one's physical and psychological performance [1, 2]. Burnout begins when a person feels overstressed in the workplace due to lack of control, work-life imbalance, and a dysfunctional workplace [3]. Physical activity may have a significant impact on mental health, and, therefore, be an effective and healthy method for preventing depression, work-related stress, anxiety, and burnout [4]. Physical activity is defined as any movement of the skeletal muscles that requires energy expenditure [5], and it helps stimulate major hormones that may improve a person's mood [6]. Dopamine, norepinephrine, and serotonin are brain chemicals that have been found to have a positive effect on mood in humans, and engaging in physical activity on a daily or regular basis can increase serotonin levels in the brain [6].

Burnout, which is characterized by physical and mental fatigue after a long period in a stressful work environment [7], consists of three essential factors: emotional exhaustion, depersonalization, and lack of personal accomplishment [8]. Causes of burnout among healthcare providers include the responsibilities they have to their patients, exposure to a high-pressured workplace, and poor work-life balance [9]. Emotional exhaustion, depression, and low self-esteem [7] can affect the provider's quality of work. During the novel coronavirus 2019 (COVID-19) pandemic, burnout was reported as high as 79% among respiratory therapists in the United States [10].

In a study with 76 resident physicians in Minnesota, 78.9% (60/76) reported a decrease in their physical activity level after they started their medical training, 53.9% (41/76) had burnout based on their Maslach Burnout Inventory (MBI) scores, and those who were able to exercise were less likely to experience burnout [11]. In a study with 89 participants divided into the control (29 participants), low-intensity training (30 participants), and high-intensity training (30 participants) groups, the low- and high-intensity groups had interactions with exercise, which had an effect on their burnout indicators. The high-intensity group showed

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greater improvement in the pre-post-exercise differences on measures of burnout [12]. This finding is similar to the results of a study with 6000 participants (5300 healthcare providers and 700 insurance employees). Physical activity was measured using an adapted version of the Saltin Grimby Physical Activity Level Scale, burnout was measured using the Shirom-Melamed Burnout Questionnaire, and anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS). The participants were divided by their activity levels; 563 (15.3%) were physically inactive, 1658 (53%) were slightly active, 1075 (29.1%) were moderately active, and 98 (2.7%) were involved in vigorous physical activity. Participants who were most active showed a greater reduction in symptoms of mental health problems compared to participants who were less active. Thus, positive changes in physical activity were related to positive outcomes in mental health over time [13]. However, another study found no association between workplace physical activity (WPA) and burnout, anxiety, depression, or occupational stress in 21 nurses in Brazil using the MBI, HADS, and Job Stress Scale; they only reported improved perceptions of physical pain and work-related fatigue [14].

Most studies have reported associations between physical activity and burnout. The intensity and type of exercise may influence outcomes of participants from many fields of work. However, the studies we reviewed did not mention the physical characteristics of the participants (e.g., underweight, overweight, or muscular) [15]. Despite the high prevalence of burnout reported among respiratory therapists during the pandemic and studies on smoking among healthcare providers to cope with anxiety, smoking was not mentioned as a method of coping with burnout in the studies we reviewed [16, 17]. The distributions of participants in the low- and high-intensity groups were unequal; therefore, no obvious evidence of a superior effect on burnout reduction was found in either the low- or high-intensity group. Most studies used small samples, which require further investigation to confirm their hypotheses [18].

Therefore, this study aimed to examine the association between physical activity and burnout among the respiratory therapy staff and student interns in hospitals in Jeddah City, Saudi Arabia, analyze participants' sociodemographic characteristics that may have an association with burnout, and measure the levels of physical activity among the respiratory therapy staff. The focus on respiratory therapists was due to the little attention found in the local literature among this group of healthcare workers, their nature of working long hours, and the psychological stress imposed due to dealing with infectious and serious diseases. The COVID-19 pandemic was in progress before and during the study period, increasing the levels of stress and risk for burnout among respiratory therapists and student interns in hospital settings [17, 19]. Based on our literature review, we included smoking in our demographic survey to analyze its contribution to burnout levels, and we assessed participants' perceptions of the effects of the COVID-19 pandemic.

METHODS

Study design, setting, and recruitment

This cross-sectional descriptive study used convenience sampling to select respiratory therapists and interns from public and private hospitals in Jeddah City, Saudi Arabia, for participation in the study. Male and female Saudi respiratory therapy interns, Saudi respiratory therapists, and non-Saudi respiratory therapists who registered with the Saudi Commission for Health Specialties were included in the study. We excluded all participants who could not read English. The sample size was calculated using a population estimate of 250 respiratory therapists [19] and interns, a confidence interval of 95%, and a 5% margin of error. The calculated sample size was 152. Ethical approval to conduct the study was received from the King Abdullah International Medical Research Center (KAIMRC) Ref. No. IRBC/1666/20.

Ethics and survey administration

After the institutional review board approved the study (No. SP20/361/J), the survey was administered to respiratory therapy staff and interns from November 2, 2020, to November 27, 2020. The survey was delivered electronically via Google Forms to avoid physical contact due to the COVID-19 pandemic. We distributed a QR-code poster to respiratory therapy managers and used a respiratory therapy social media group to invite them to enroll in the study. A total of 152 survey respondents, including 54 males and 98 females, agreed to participate in the study, of which 135 were Saudi nationals and 17 were non-Saudi nationals. All participants were informed of the study's purpose and promised anonymity; all participation was voluntary. They were also assured by the researchers that their survey responses would remain confidential and that they would be used only for research purposes. A period of 1 year was required to write the proposal, receive IRB approval, collect, enter, and analyze the data and write the manuscript.

The survey was divided into three sections consisting of questions related to participants' sociodemographic characteristics, burnout, and physical activity. Burnout was measured using the Maslach Burnout Inventory – Human Services Survey for Medical Personnel (MBI-HSS (MP)), and physical activity was measured using the International Physical Activity Questionnaire – Long Form (IPAQ-LF).

Measures and instruments

Physical activity (exposure) was measured using the IPAQ-LF. This questionnaire was established by a group of experts to facilitate the observation of physical activity based on a global standard. It was piloted in 14 centres of 12 countries to determine its validity and reliability [20], and several published studies have demonstrated its reliability and validity [21–23]. The IPAQ-LF divides the physical activity of respondents by metabolic equivalent minutes per week into high physical activity, moderate physical activity, and low physical activity. Burnout (outcome) was measured in this study using the MBI-HSS (MP), which was developed by Christina Maslach and Susan E. Jackson. Many studies have since confirmed the validity and reliability of the MBI-HSS (MP) [23, 24], which measures emotional exhaustion, depersonalization, and reduced personal accomplishment using questions to assess burnout levels. Nine questions measure emotional exhaustion, five questions measure depersonalization, and eight questions measure personal accomplishments. Thus, each scale's score is determined and interpreted separately without summing the scores of the three scales. Studies using the MBI-HSS (MP) have reported the scale's good psychometric properties when it is used with professionals working in medical settings (Table 1) [24].

Statistical analysis

All of the collected data were entered into Microsoft Excel (Microsoft Corp., 2016) and then imported for additional analyses to JMP software (trial version 15.2.1, SAS Institute Inc., Cary, NC, 1989–2021 (482026)). Descriptive statistics for all of the included variables are presented. Data on the qualitative (categorical) variables were analyzed, such as gender, social demographics, living arrangements, nationality, lifestyle, sociality, loans from banks, smoking, religion, and marital status. Data on the quantitative (continuous) variables, such as age, years of work experience, and number of children, were also analyzed. Inferential statistics, such as correlation analysis and analysis of variance (ANOVA), were used to analyze the data. The *t* test and chi-squared test were performed to examine the between-group differences in the association between burnout and physical activity. The significance level for the statistical analyses was set to $P < 0.0500$.

RESULTS

Of the eligible 250 respiratory therapists and interns, 154 completed both the MBI-HSS (MP) and the IPAQ-LF. Two of the eligible participants were excluded because they refused to participate in the study. The 152 completed surveys represented a response rate of 60.8%.

TABLE 1

Normative scores on the Maslach Burnout Inventory for interpreting the level of burnout

Level of burnout	Emotional exhaustion	Depersonalization	Personal accomplishment
Low burnout	<24	<10	>41
Moderate burnout	25–36	11–16	35–40
High burnout	>37	>17	<34

Participants' demographics

The majority of participants (64.4%, *n* = 98) were males, and 88.8% (*n* = 135) were from Saudi Arabia. The percentage of respiratory therapy staff was 42.8% (*n* = 65), and the percentage of interns was 57.2% (*n* = 87).

TABLE 2

Characteristics of the study's participants

Characteristic	Participants (*N* = 152)
Age (years) (median IQRs)	23 (22, 23, 29)
Gender *n* (%)	
Male	98 (64.5)
Female	54 (35.5)
Nationality *n* (%)	
Saudi	135 (88.8)
Yemeni	4 (2.6)
Pakistani	5 (3.3)
Indian	1 (0.7)
Filipino	4 (2.6)
Nigerian	1 (0.7)
Jordanian	2 (1.3)
Having religious beliefs *n* (%)	
Yes	121 (79.6)
No	31 (20.4)
Marital status *n* (%)	
Single	114 (75.0)
Married	34 (22.3)
Divorced	4 (2.7)
Living status	
Rental	48 (31.5)
Work dormitory	9 (5.9)
Privately owned residence	95 (62.5)
Having a loan *n* (%)	
Yes	36 (23.7)
No	116 (76.3)
Smoking *n* (%)	
Yes	47 (30.9)
No	84 (55.3)
Occasionally	21 (13.8)
Chronic disease *n* (%)	
Yes	28 (18.4)
No	124 (81.6)
Did the global epidemic (COVID-19) affect your previous answers? *n* (%)	
Yes	63 (40.8)
No	89 (58.6)

IQR, interquartile range.

Most of the participants had religious beliefs, were single, owned private houses, and lived with their families. Some participants (31.5%, *n* = 48) were smokers. The interquartile ranges of the participants' ages (in years) were 25% = 22, median = 23, and 75% = 29. The global epidemic COVID-19 affected 40.8% (*n* = 63) of the survey answers for the participants (Table 2).

Approximately 40.8% (*n* = 62) of the respondents engaged in high levels of physical activity, 25% (*n* = 38) participated in moderate physical activity, and 34.2% (*n* = 52) engaged in low levels of physical activity. No significant gender differences were found in the levels of physical activity (*P* = 0.974) (Figure 1).

Approximately 44.7% (*n* = 68) of the participants reported emotional exhaustion, 33.5% (*n* = 51) reported depersonalization, and 46.7% (*n* = 71) reported a sense of low personal accomplishment, indicating a high level of burnout. A high burnout level related to emotional exhaustion was associated with nationality (*P* = 0.0061), and the chi-squared test indicated the presence of an association between a high burnout level related to emotional exhaustion and smoking (*P* = 0.0424) (Table 3).

Table 4 shows the results of the analysis of burnout levels due to emotional exhaustion, depersonalization, and lack of personal accomplishment by level of physical activity. All of the *P* values were greater than 0.05, indicating no significant differences among the three dimensions of the MBI-HSS (MP) by physical activity level. However, there is evidence that the COVID-19 pandemic affected the participants' levels of physical activity (*P* = 0.0312); 23% of them reported a positive effect of the pandemic, 51% reported a negative effect, and 26% reported no effect.

DISCUSSION

Our findings showed no relationship between physical activity and any of the burnout dimensions (emotional exhaustion, depersonalization, or lack of personal accomplishment). These results can be explained partially by (1) the study's small sample size, cross-sectional design, and data collection methods; (2) the effects of the COVID-19 pandemic, and/or (3) the nature of the work of respiratory therapists and their reliance on coping methods other than physical activity to cope with anxiety. Approximately 40.8% of the participants indicated that their responses to questions were affected by the COVID-19 pandemic. This research was conducted during a critical time for respiratory therapists, given their role as frontline caregivers. The data were collected after the full curfew was lifted and by following precautions, such as wearing facemasks and social distancing. Thus, we expected a high level of burnout.

To our knowledge this is the first research that studies burnout with association to physical activity among respiratory therapist post-COVID-19

FIGURE 1

Distribution of participants by gender and physical activity.

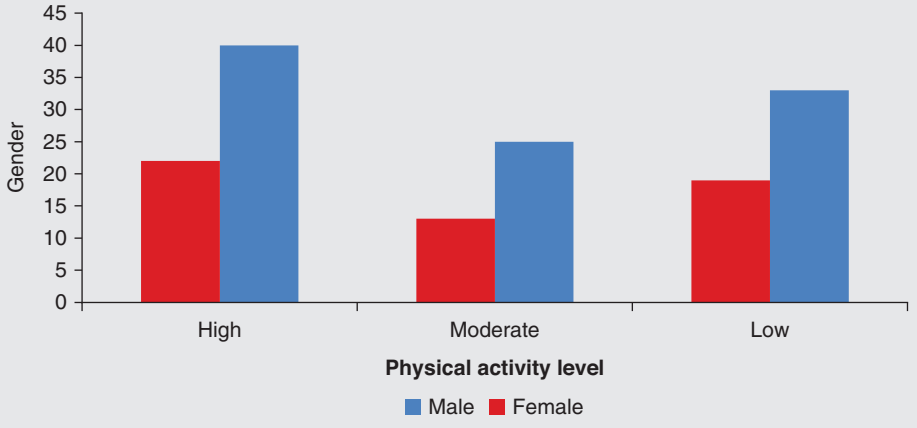

TABLE 3

Factors influencing emotional exhaustion

Emotional exhaustion	Participants (*N* = 152)
Nationality *n* (%)	
Saudi	135 (88.8)
High	99 (73.3)
Moderate	26 (19.3)
Low	10 (7.4)
Yemeni	4 (2.6)
High	4 (100)
Moderate	0
Low	0
Pakistani	5 (3.3)
High	5 (100)
Moderate	0
Low	0
Indian	1 (0.7)
High	0
Moderate	1 (100)
Low	0
Filipino	4 (2.6)
High	4 (100)
Moderate	0
Low	0
Nigerian	1 (0.7)
High	1 (100)
Moderate	0
Low	0
Jordanian	2 (1.3)
High	0
Moderate	2 (100)
Low	0
Smoking	
Yes	47 (30.9)
High	40 (85.1)
Moderate	7 (14.9)
Low	0
No	84 (55.3)
High	56 (66.7)
Moderate	20 (23.8)
Low	8 (9.5)
Occasionally	21 (13.8)
High	17 (80.1)
Moderate	4 (19.9)
Low	0

TABLE 4

Association between level of physical activity by level of burnout and perception of the effects of the COVID-19 pandemic

Test	Prob>ChiSq
Level of physical activity by level of burnout (EE)	0.9475
Level of physical activity by level of burnout (Dep)	0.2523
Level of physical activity by level of burnout (PA)	0.0835
The effect of COVID-19 on physical activity	0.0312
The effect of COVID-19 on level of burnout (EE)	0.6652
The effect of COVID-19 on level of burnout (Dep)	0.6241
The effect of COVID-19 on level of burnout (PA)	0.9934

EE, emotional exhaustion; Dep, depersonalization; PA, personal accomplishment; Prob, probability; ChiSq, chi-squared.

pandemic within our region. A study in which the MBI, HADS, and Job Stress Scale were administered to 21 nurses in a palliative care unit in Brazil found no association between WPA and burnout; however, improvements in participants' perceptions of physical pain and work-related fatigue were observed [14]. These results and those of our study might be due to their small samples, as most of the other previous studies found an association between physical activity and burnout [11, 12, 14]. Even though females in another study had a higher level of physical activity, they continued to have high levels of burnout [11]. However, a study that focused on emotional exhaustion and considered it the main dimension of burnout found a robust negative relationship between physical activity and burnout, which was considered to be evidence of a positive relationship between physical activity and exhaustion [5]. Thus, it seems that the previously mentioned studies, even those with different methods, all share findings similar to those of our study. In a study that examined the relationships among exercise (with three levels of intensity), burnout, and metabolic syndrome by measuring the level of burnout before and after participating in the program, the results showed the program was effective in reducing burnout. The pre- and post-program data showed that exercise intensity was a major factor in reducing burnout [12].

Our results showed a significant association between smoking and level of burnout. A study of 41 psychiatric hospitals in China that examined the correlates of smoking among mental health professionals in 2020 [16] found that among the 21,858 participants, 8.6% (*n* = 1170) were current smokers and 3.3% (*n* = 454) were past smokers. Similar to our results, they found higher rates of burnout among the smokers compared to the non-smokers (45.6%) using the MBI. A higher smoking rate was significantly associated with burnout, being a nurse, older age, and other factors. However, regular exercise and a higher educational level were associated with a lower risk of smoking. The mental health professionals who met the burnout criteria had 1.3 greater odds of being a smoker. Hence, the probability of burnout often accompanies low job satisfaction and an unhealthy lifestyle, including smoking, which is commonly used as a coping behaviour for symptoms of anxiety [25].

Levels of burnout among 1961 healthcare workers during the COVID-19 pandemic in 2020 [26] were measured using the MBI – General Survey with its three subscales (emotional exhaustion, cynicism, and professional efficacy). Approximately 38.3% (*n* = 752) of participants had symptoms of high emotional exhaustion, 46.5% (*n* = 911) had low professional efficacy, and 26.5% (*n* = 519) had a high level of cynicism. The prevalence of burnout was high among the staff in the intensive care units (57.0% – emotional exhaustion, 47.8% – professional efficacy, and 40.1% – cynicism) and sub-acute intensive care units (53.0% – emotional exhaustion, 47.6% – professional efficacy, and 22.6% – cynicism). A similar study in Saudi Arabia with 646 healthcare workers in 2021 found that 75% (*n* = 485) of the participants reported burnout [27], as measured by the Copenhagen Burnout Inventory. Both studies identified factors that were significantly associated with burnout during the COVID-19 pandemic (e.g., working longer hours, feeling forced to deal with patients with COVID-19, and having direct contact with critically ill patients with COVID-19). All of these findings are consistent with our outcomes. Therefore, we can conclude that COVID-19 increased the level of burnout among healthcare workers, which might have been due to their insufficient sleep, the subsequent effects of quarantine, a high level of mental stress, and/or the previously mentioned factors. These factors may explain the high level of burnout among respiratory therapists in the present study because the data were collected during the COVID-19 pandemic.

Study limitations

A limitation of this study was its inability to access more respiratory therapists because they worked on isolation units in the hospitals. The self-report survey had the potential for misclassification bias, and the researchers were unable to interview participants because the pandemic precautions restricted the types and amount of data that could be collected. Lack of randomization and a control group precluded plausible interpretations of the study's results because work- and staff-related issues, as well as COVID-19, might have interacted with one another.

A study should be conducted to determine whether the methods of dealing with burnout varied significantly before and after the pandemic. We recommend that future studies 1) focus on specific types of physical activity, such as yoga, martial arts, or others, that might decrease stress;

2) explore novel methods of decreasing burnout and its effects on respiratory therapists; 3) test various types of relaxation for respiratory therapists during stressful periods; and 4) use multivariate analyses to control for potential confounding variables.

CONCLUSION

Burnout is considered a global phenomenon affecting people in different fields of work. Our findings showed no relationship between physical activity and the three major factors representative of burnout (emotional exhaustion, depersonalization, and lack of personal accomplishment). Even though, approximately 41% of the participants indicated that their responses to questions were affected by the COVID-19 pandemic.

DISCLOSURES

Acknowledgement

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Ethical approval

This study was approved by our institutional ethical board (No. SP20/361/J).

Competing interests

All authors have completed the ICMJE uniform disclosure form and declare no conflict of interest.

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Authors' contributions

All authors contributed to the conception or design of the work, the acquisition, analysis, or interpretation of the data. All authors were involved in drafting and commenting on the paper and have approved the final version.

REFERENCES

1. InformedHealth.org. Depression: what is burnout? Cologne, Germany: Institute for Quality and Efficiency in Health Care (IQWiG). Updated June 18, 2020. Available at: https://www.ncbi.nlm.nih.gov/books/NBK279286/ (Accessed November 5, 2021)
2. Briones-Peralta MÁ, Pardo-García I, Escribano-Sotos F. Effects of a practical training programme on burnout among professional caregivers in a care home for older adults with dementia: a pilot study. Psychogeriatrics 2020;4:391–7. doi: 10.1111/psyg.12523
3. WHO. Physical activity. WHO Newsroom; 2020. Available at: https://www.who.int/news-room/fact-sheets/detail/physical-activity (Accessed November 5, 2021)
4. Collins R. Exercise, depression, and the brain. Healthline; 2020. Available at: https://www.healthline.com/health/depression/exercise (Accessed November 5, 2021).
5. Naczenski L, Vries J, Hooff M, Kompier M. Systematic review of the association between physical activity and burnout. Occup Health 2017;6:477–94. Available at: https://www.jstage.jst.go.jp/article/joh/59/6/59_17-0050-RA/_pdf/-char/ja [Accessed November 6, 2021].
6. Maslach C, Jackson S, Leiter M. Maslach Burnout Inventory. 4th ed. CA: Mind Garden Inc; 2018.
7. World Health Organization. Burn-out an "occupational phenomenon": International Classification of Diseases. 2019. Available at: https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases (Accessed November 5, 2021).
8. Perez-Mármol JM, Brown T. An examination of the structural validity of the Maslach Burnout Inventory-Student Survey (MBI-SS) using the Rasch Measurement Model. Health Prof Educ 2018;3:259–72. Available at: https://www.sciencedirect.com/science/article/pii/S2452301118300166 (Accessed November 6, 2021).
9. Ridge D. Burnout in healthcare staff is common-and can make empathising with patients difficult. The Conversation; 2020. Available at: https://theconversation.com/burnout-in-healthcare-staff-is-common-and-can-make-empathising-with-patients-difficult-145862 (Accessed November 5, 2021).
10. Miller AG, Roberts KJ, Smith BJ, et al. Prevalence of burnout among respiratory therapists amid the COVID-19 pandemic. Respir Care 2021;66(11):1639–48. doi: 10.4187/respcare.09283
11. Olson SM, Odo NU, Duran AM, Pereira AG, Mandel JH. Burnout and physical activity in Minnesota internal medicine resident physicians. J Grad Med Educ 2014;4:669–74. doi: 10.4300/JGME-D-13-00396
12. Tsai HH, Yeh CY, Su CT, Chen CJ, Peng SM, Chen RY. The effects of exercise program on burnout and metabolic syndrome components in banking and insurance workers. Ind Health 2013;3:336–46. doi: 10.2486/indhealth.2012-0188
13. Lindwall M, Gerber M, Jonsdottir IH, Börjesson M, Ahlborg G Jr. The relationships of change in physical activity with change in depression, anxiety, and burnout: a longitudinal study of Swedish healthcare workers. Health Psychol 2014;11:1309–18. doi: 10.1037/a0034402
14. Freitas AR, Carneseca EC, Paiva CE, Paiva BSR. Impact of a physical activity program on the anxiety, depression, occupational stress and burnout syndrome of nursing professionals. Rev Lat Am Enfermagem 2014;2:332–6. doi: 10.1590/0104-1169.3307.2420
15. Rajan TM, Menon V. Psychiatric disorders and obesity: a review of association studies. J Postgrad Med 2017;3:182–90. doi: 10.4103/jpgm.JPGM_712_16
16. Xia L, Jiang F, Rakofsky J, et al. Cigarette smoking, health-related behaviors, and burnout among mental health professionals in China: a nationwide survey. Frontiers in psychiatry. Frontiers Media S.A.; 2020. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7379885/ (Accessed September 14, 2022).
17. Mckinnon M, Foster F, Stressing an already stressed profession: impact of COVID-19 moral injury on RRTS. Proceedings from the Canadian Society of Respiratory Therapists Annual Conference, May 5–7, 2021, Coping and Caring in the RT Profession Stream. Can J Respir Ther 2021;57:32–38.
18. Faber J, Fonseca LM. How sample size influences research outcomes. Dental Press J Orthod 2014;4:27–9. doi: 10.1590/2176-9451.19.4.027-029.ebo
19. Ghazi Alotaibi. Status of respiratory care profession in Saudi Arabia: a national survey. 2015. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4286847/ [Accessed November 8, 2021].
20. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc 2003;8:1381–95. doi: 10.1249/01.MSS.0000078924.61453.FB
21. Wanner M, Probst-Hensch N, Kriemler S, Meier F, Autenrieth C, Martin BW. Validation of the long international physical activity questionnaire: influence of age and language region. Prev Med Rep 2016;3:250–6. doi: 10.1016/j.pmedr.2016.03.003
22. Tomioka K, Iwamoto J, Saeki K, Okamoto N. Reliability and validity of the International Physical Activity Questionnaire (IPAQ) in elderly adults: the Fujiwara-kyo study. J Epidemiol 2011;6:459–65. doi: 10.2188/jea.JE20110003
23. Maslach C, Jackson SE, Leiter PM, Schaufeli W. Maslach Burnout Inventory (MBI). Complete Dissertations by Statistics Solutions, Directory of Survey Instruments; 1996. Available at: https://www.statisticssolutions.com/maslach-burnout-inventory-mbi/ (Accessed November 6, 2021).
24. Lin CY, Alimoradi Z, Griffiths MD. Psychometric properties of the Maslach Burnout Inventory for Medical Personnel (MBI-HSS-MP). Pubmed Central; 2021. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8829575/ (Accessed August 19, 2022).
25. Buckner JD, Zvolensky MJ, Jeffries ER, Schmidt NB. Robust impact of social anxiety in relation to coping motives and expectancies, barriers to quitting, and cessation-related problems. Exper Clin Psychopharmacol 2014. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4116795/ (Accessed September 14, 2022).
26. Lasalvia A. Levels of burn-out among healthcare workers during the COVID-19 pandemic and their associated factors: a cross-sectional study in a tertiary hospital of a highly burdened area of North-East Italy. BMJ Open 2021. Available at: https://pubmed.ncbi.nlm.nih.gov/33455940/ (Accessed September 14, 2022).
27. Alsulimani LK, Farhat AM, Borah RA, et al. Health care worker burnout during the COVID-19 pandemic. Saudi Med J 2021. Available at: https://smj.org.sa/content/42/3/306 (Accessed September 14, 2022).