



**ARTICLE**

## COVID-19, Mental Health and Its Relationship with Workplace Accidents

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### ABSTRACT

The general objective of this article is to show the relationship that exists in the COVID-19 pandemic, the mental health of people and the propensity for work-related accidents in companies. Various results are shown that detail how COVID-19 has generated and is generating mental alterations in people such as post-traumatic stress disorder, PTSD for its acronym in English. Likewise, data are presented that report the influence of mental health as a precursor to workplace accidents in different industries, with which it can be concluded that COVID-19 needs a comprehensive approach in companies to prevent it from negatively impacting workers and they end up accident during their daily work. Some concrete actions are proposed to promote and avoid in companies so that workers can be better managed in times of a COVID-19 pandemic.

### KEYWORDS

COVID-19; mental health; occupational accidents; PTSD; Peru; distress

## 1 Introduction

The COVID-19 pandemic has exposed the weaknesses of the healthcare system and public health policies globally [1–3]. Particularly, the lack of organization support for healthcare workers became evident [4], causing an increase in the desire of healthcare workers to leave their jobs due to work overload and mental distress [5–7]. The general public was massively exposed to fake news [8] and conspiracy theories [9], which increased mental distress causing an increase in the search of preventive and/or curative measures with unproven drugs self-medication [2,10] and the use of medicinal plants [2,11]. It also affected the intention of the general public to get vaccinated [12]. Because of the imposed mandatory quarantine various industries were severely affected such as small and medium-sized businesses [13,14], sports [15], hospitality [16,17], education [18–20], healthcare [21], circular economy [22], entrepreneurship [23], technology [24], which at the same time caused price variation in lower goods [25], intention to purchase online [26] and a high unemployment rate [27,28]. The COVID-19



pandemic has changed the way people work, added mental distress, concerns and a general sense of uncertainty for their health and work status, which can distract workers and make them prone to suffer work-related accidents. We present the evidence and the conceptual relationship between mental health and work-related accidents.

## **2 Conspiracy Theories and Mental Health**

Since its appearance in late 2019, COVID-19 has gradually caused various negative impacts on the population. These negative effects became more evident as strict quarantines were imposed in many countries causing people to change their daily routine spending many hours at home without contact with close relatives, co-workers and friends [29,30]. Another aspect was the proliferation of fake news (hoaxes), which caused misinformation, confusion and anguish in people that did not know if the information was real and overall feeling more exposed to risks that were not necessarily real [8]. In parallel, an exponential increase in conspiracy theories was also observed, causing division and antagonism between the people who believe in them and the ones who do not [31]. Conspiracy theories form a set of beliefs, practices and even its own language, leaving its mark on the personality of those who share it, which explains the great power that holds with the masses [31]. Conspiracy theories can be defined as the efforts made by a specific group, usually a minority, to understand the cause of an event by creating arguments based on secret group conspiracies rather than trying to understand them as random processes or natural flow [32]. Social crises such as those suffered in the postwar period and during events as lethal as the current COVID-19 pandemic triggers the creation or the resurgence of old conspiracy theories that are mixed with the present to generate new conspiracy theories such as the anti-vaccine movement [33,34]. Although most conspiracy theories are incorrect or only based on assumptions, they allow certain people to find some logical reason for things. This situation of uncertainty and lack of control when the origin of a phenomenon or a pandemic cannot be answered makes them easy to follow any explanation, without stopping to reason about its coherence or evidence.

Some examples of conspiracy theories during the COVID-19 pandemic include: the pandemic is a lie and that governments only seek to scare the population. Thus, they are convinced that there are no viral infections, and will go out to carry out their daily activity without a mask, generating a greater collapse of the healthcare system and the negative impact on the economy [9]. Another common example is that since it is believed that there are economic interests behind the COVID-19 pandemic, they use inexpensive and unproven means to prevent or treat COVID-19 such as ivermectin, colloidal silver and chlorine dioxide [2]. The unfortunate thing about these conspiracy theories is that they bring negative results such as spreading disinformation [35,36] and reduce social distancing [37]. Recently our research team has reported that the belief in conspiracy theories can be predictors of mental health in healthcare workers [38]. Furthermore, people with previous medical conditions, psychiatric illness or substance use abuse are at an increased risk of mental illness due to COVID-19 pandemic [39,40], which has been reported worldwide [41–51]. An altered mental health state can have different repercussions in people because of their work status. Work activity has been reported to play a role in the incidence and recovery of post-traumatic stress syndrome (PTSD) in Italy [52], United States [53], Saudi Arabia [54] and China [55].

## **3 Mental Health and Work-Related Accidents**

People with altered mental health due to various causes are in a more vulnerable condition for work-related accidents. It has been reported, before the COVID-19 pandemic, that nurses in Japan with poor mental health were more prone to occupational accidents [56]. It has also been reported that workers at a steel company in Iran, before the pandemic, with high levels of stress had an increased propensity for occupational accidents [57]. This evidence should be taken with great attention since due to the COVID-19 pandemic and social isolation many people stopped working reducing temporarily the propensity to work-related accidents. However, as workers begin to return to factories, construction and

various physical spaces with a high risk of occupational accidents, their current mental health state after this pandemic could play a role in the occurrence of work-related accidents. To the best of our knowledge there is only one recent study that assessed the couriers' safety and health risks before and during the COVID-19 pandemic in Israel [58]. It was reported that more than 60% of the couriers reported increased stress due to the COVID-19 pandemic [58]. Furthermore, stress and work overload (amount of working hours and shift duration) were related to accidents on the road and musculoskeletal pains [58]. It is important to mention that the COVID-19 pandemic not only altered the mental health state, but social isolation has reduced the time of physical activity, causing a reduction in muscle mass, flexibility and cardiovascular performance [59–61]. Thus, it is expected that response time and physical work performance in construction sites and factories that handle heavy machinery, drive or perform high-risk activities could be impaired and can increase the risk for work-related accidents.

#### 4 Concrete Actions before Returning to Work

During the COVID-19 pandemic various approaches were proposed to cope and manage the mental health of workers, such as the ones that continued working such as emergency responders, police and military, food and customer health. Different approaches were also implemented for remote workers and people taking care of COVID-19 infected patients and chronic patients [62]. Even though each person has the ability to find different coping mechanism against mental distress, stress and PTSD, some recommendations to promote and other to avoid have been published [63]:

- Promote: Positive thoughts, exercise regularly, balanced diet, relaxation exercises, socialization (online), and take breaks during the work routine.
- Avoid: Substance abuse, consistently eating very fatty or sugary foods, excessive online activity, excessive television viewing, focus on the negative aspects of COVID-19, distribute fake news (hoaxes), and believe in fake news (hoaxes).

In addition, we recommend companies to revise their Corporate Social Responsibility plans to offer constant accompaniment of workers to meet their personal demands and avoid unfortunate consequences on the workers' health and business performance. To the workers we recommend to consciously self-evaluate your weight, health status, mental health and overall, your capacity or incapacity to communicate how you feel internally and externally. Furthermore, ask for retraining if you operate machinery or if you drive, and request protective personal equipment and safety equipment if you perform physical activity. The world took a step back in most of its economic activities and had to be reactivated, our bodies and mind also had to step back to adapt for the effects of the pandemic, then it is only logical to go through a re-learning curve to return to our work activities.

#### 5 Conclusion

There is conceptual correlation between mental health and propensity of work-related accidents. Companies must take preventive actions and evaluate the effect on the mental health of their workers to prevent work-related accidents. Workers must self-evaluate and request for re-training or additional tools or equipment in order to feel comfortable with their job responsibilities, especially the ones with high risk of work-related accidents. Further studies to evaluate the mental health and propensity of work-related accidents in different types of work is warranted.

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## References

1. Rojas Román, B., Moscoso, S., Chung, S. A., Limpías Terceros, B., Álvarez-Risco, A. et al. (2020). Tratamiento de la COVID-19 en Perú y Bolivia y los riesgos de la automedicación. *Revista Cubana e Farmacia*, 53(2), 1–20.
2. Yáñez, J. A., Chung, S. A., Román, B. R., Hernández-Yépez, P. J., García-Solorzano, F. O. et al. (2021). Chapter 14—prescription, over-the-counter (OTC), herbal, and other treatments and preventive uses for COVID-19. In: Hadi Dehghani, M., Karri, R. R., Roy, S. (Eds.), *Environmental and health management of novel coronavirus disease (COVID-19)*, pp. 379–416. London, UK: Academic Press.
3. Yáñez, J. A., Álvarez-Risco, A., Delgado-Zegarra, J. (2020). COVID-19 in Peru: From supervised walks for children to the first case of kawasaki-like syndrome. *British Medical Journal*, 369, m2418. DOI 10.1136/bmj.m2418.
4. Zhang, S. X., Sun, S., Afshar Jahanshahi, A., Álvarez-Risco, A., Ibarra, V. G. et al. (2020). Developing and testing a measure of COVID-19 organizational support of healthcare workers—results from Peru, Ecuador, and Bolivia. *Psychiatry Research*, 291, 113174. DOI 10.1016/j.psychres.2020.113174.
5. Zhang, S. X., Chen, J., Afshar Jahanshahi, A., Álvarez-Risco, A., Dai, H. et al. (2021). Succumbing to the COVID-19 pandemic—healthcare workers Not satisfied and intend to leave their jobs. *International Journal of Mental Health and Addiction*, 20, 956–965. DOI 10.1007/s11469-020-00418-6.
6. Zhang, S. X., Chen, J., Jahanshahi, A. A., Álvarez-Risco, A., Dai, H. et al. (2021). Correction to: Succumbing to the COVID-19 pandemic—Healthcare workers Not satisfied and intend to leave their jobs. *International Journal of Mental Health and Addiction*. DOI 10.1007/s11469-020-00418-6.
7. Yáñez, J. A., Jahanshahi, A. A., Álvarez-Risco, A., Li, J., Zhang, S. X. (2020). Anxiety, distress, and turnover intention of healthcare workers in Peru by their distance to the epicenter during the COVID-19 crisis. *American Journal of Tropical Medicine and Hygiene*, 103(4), 1614–1620. DOI 10.4269/ajtmh.20-0800.
8. Álvarez-Risco, A., Mejía, C. R., Delgado-Zegarra, J., Del-Aguila-Arcatales, S., Arce-Esquivel, A. A. et al. (2020). The Peru approach against the COVID-19 infodemic: Insights and strategies. *American Journal of Tropical Medicine and Hygiene*, 103(2), 583–586. DOI 10.4269/ajtmh.20-0536.
9. Chen, X., Zhang, S. X., Jahanshahi, A. A., Álvarez-Risco, A., Dai, H. et al. (2020). Belief in a COVID-19 conspiracy theory as a predictor of mental health and well-being of health care workers in Ecuador: Cross-sectional survey study. *JMIR Public Health and Surveillance*, 6(3), e20737–e20737. DOI 10.2196/20737.
10. Quispe-Cañari, J. F., Fidel-Rosales, E., Manrique, D., Mascaró-Zan, J., Huamán-Castillón, K. M. et al. (2021). Self-medication practices during the COVID-19 pandemic among the adult population in Peru: A cross-sectional survey. *Saudi Pharmaceutical Journal*, 29(1), 1–11. DOI 10.1016/j.jsps.2020.12.001.
11. Villena-Tejada, M., Vera-Ferchau, I., Cardona-Rivero, A., Zamalloa-Cornejo, R., Quispe-Florez, M. et al. (2021). Use of medicinal plants for COVID-19 prevention and respiratory symptom treatment during the pandemic in Cusco, Peru: A cross-sectional survey. *PLoS One*, 16(9), e0257165. DOI 10.1371/journal.pone.0257165.
12. Vizcardo, D., Salvador, L. F., Nole-Vara, A., Dávila, K. P., Álvarez-Risco, A. et al. (2022). Sociodemographic predictors associated with the willingness to Get vaccinated against COVID-19 in Peru: A cross-sectional survey. *Vaccines*, 10(1), 48. DOI 10.3390/vaccines10010048.
13. Shafi, M., Liu, J., Ren, W. (2020). Impact of COVID-19 pandemic on micro, small, and medium-sized enterprises operating in Pakistan. *Research in Globalization*, 2, 100018. DOI 10.1016/j.resglo.2020.100018.
14. Soriano, V., Corral, O. (2020). Keeping alive enterprises while embracing unprecedented COVID-19 restrictions. *Therapeutic Advances Infectious Disease*, 7. DOI 10.1177/2049936120920175.
15. Beiderbeck, D., Frevel, N., von der Gracht, H. A., Schmidt, S. L., Schweitzer, V. M. (2021). The impact of COVID-19 on the European football ecosystem—A delphi-based scenario analysis. *Technological Forecasting and Social Change*, 165, 120577. DOI 10.1016/j.techfore.2021.120577.
16. Álvarez-Risco, A., Estrada-Merino, A., Perez-Luyo, R. (2020). Sustainable development goals in hospitality management. In: Ruël, H., Lombarts, A. (Eds.), *Sustainable hospitality management*, vol. 24, pp. 159–178. Bingley, West Yorkshire, England: Emerald Publishing Limited.
17. Yan, J., Kim, S., Zhang, S. X., Foo, M. D., Álvarez-Risco, A. et al. (2021). Hospitality workers' COVID-19 risk perception and depression: A contingent model based on transactional theory of stress model. *International Journal of Hospitality Management*, 95, 1–11. DOI 10.1016/j.ijhm.2021.102935.

18. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Yáñez, J. A., Rosen, M. A., Mejia, C. R. (2021). Influence of technostress on academic performance of university medicine students in Peru during the COVID-19 pandemic. *Sustainability*, 13(16), 8949. DOI 10.3390/su13168949.
19. Alvarez-Risco, A., Estrada-Merino, A., Anderson-Seminario, M. D. L. M., Mlodzianowska, S., García-Ibarra, V. et al. (2021). Multitasking behavior in online classrooms and academic performance: Case of university students in Ecuador during COVID-19 outbreak. *Interactive Technology and Smart Education*, 18(3), 422–434. DOI 10.1108/ITSE-08-2020-0160.
20. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Rosen, M. A., García-Ibarra, V., Maycotte-Felkel, S. et al. (2021). Expectations and interests of university students in COVID-19 times about sustainable development goals: Evidence from Colombia, Ecuador, Mexico, and Peru. *Sustainability*, 13(6), 3306. DOI 10.3390/su13063306.
21. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Yanez, J. A. (2021). Telemedicine in Peru as a result of the COVID-19 pandemic: Perspective from a country with limited internet access. *The American Journal of Tropical Medicine and Hygiene*, 105(1), 6–11. DOI 10.4269/ajtmh.21-0255.
22. Alvarez-Risco, A., Estrada-Merino, A., Rosen, M. A., Vargas-Herrera, A., Del-Aguila-Arcentales, S. (2021). Factors for implementation of circular economy in firms in COVID-19 pandemic times: The case of Peru. *Environments*, 8(9), 95. DOI 10.3390/environments8090095.
23. Alvarez-Risco, A., Mlodzianowska, S., García-Ibarra, V., Rosen, M. A., Del-Aguila-Arcentales, S. (2021). Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: Case of Ecuador. *Sustainability*, 13(11), 6447. DOI 10.3390/su13116447.
24. Apcho-Ccencho, L. V., Cuya-Velásquez, B. B., Alvarado Rodríguez, D., Anderson-Seminario, M. D. L. M., Alvarez-Risco, A. et al. (2021). The impact of international price on the technological industry in the united states and china during times of crisis: Commercial war and COVID-19. In: Lawrence, K. D., Klimberg, R. K. (Eds.), *Advances in business and management forecasting*, vol. 14, pp. 149–160. Bingley, West Yorkshire, England: Emerald Publishing Limited.
25. Leiva-Martinez, M. A., Anderson-Seminario, M. D. L. M., Alvarez-Risco, A., Estrada-Merino, A., Mlodzianowska, S. (2021). Price variation in lower goods as of previous economic crisis and the contrast of the current price situation in the context of COVID-19 in Peru. In: Lawrence, K. D., Klimberg, R. K. (Eds.), *Advances in business and management forecasting*, vol. 14, pp. 161–166. Bingley, West Yorkshire, England: Emerald Publishing Limited.
26. Alvarez-Risco, A., Quipuzco-Chicata, L., Escudero-Cipriani, C. (2021). Determinantes de la intención de recompra en línea en tiempos de COVID-19: Evidencia de una economía emergente. *Lecturas de Economía*, 96, 101–143. DOI 10.17533/udea.le.n96a342638.
27. Dreger, C., Gros, D. (2021). Lockdowns and the US unemployment crisis. *Economics of Disasters and Climate Change*, 5, 1–15. DOI 10.1007/s41885-021-00092-5.
28. Yu, X., Zhang, Y., Sun, H. (2021). Modeling COVID-19 spreading dynamics and unemployment rate evolution in rural and urban counties of alabama and New York using fractional derivative models. *Results in Physics*, 26, 104360. DOI 10.1016/j.rinp.2021.104360.
29. Li, Y., Peng, J., Tao, Y. (2021). Relationship between social support, coping strategy against COVID-19, and anxiety among home-quarantined Chinese university students: A path analysis modeling approach. *Current Psychology*, 10, 1–16. DOI 10.1007/s12144-021-02334-x.
30. Chen, P. J., Pusica, Y., Sohaei, D., Prassas, I., Diamandis, E. P. (2021). An overview of mental health during the COVID-19 pandemic. *Diagnosis*, 8(4), 403–412. DOI 10.1515/dx-2021-0046.
31. Farr, R., Moscovici, S., Tajfel, H. (1984). Social representations. *European Sociological Review*, 2(1), 63–67.
32. Douglas, K. M., Sutton, R. M., Callan, M. J., Dawtry, R. J., Harvey, A. J. (2016). Someone is pulling the strings: Hypersensitive agency detection and belief in conspiracy theories. *Thinking & Reasoning*, 22(1), 57–77. DOI 10.1080/13546783.2015.1051586.
33. van Prooijen, J. W., Douglas, K. M. (2017). Conspiracy theories as part of history: The role of societal crisis situations. *Memory Studies*, 10(3), 323–333. DOI 10.1177/1750698017701615.

34. Muric, G., Wu, Y., Ferrara, E. (2021). COVID-19 vaccine hesitancy on social media: Building a public twitter dataset of anti-vaccine content, vaccine misinformation and conspiracies. *JMIR Public Health and Surveillance*, 7(11), 1–13. DOI 10.2196/30642.
35. Barua, Z., Barua, S., Aktar, S., Kabir, N., Li, M. (2020). Effects of misinformation on COVID-19 individual responses and recommendations for resilience of disastrous consequences of misinformation. *Progress in Disaster Science*, 8, 100119. DOI 10.1016/j.pdisas.2020.100119.
36. Jolley, D., Meleady, R., Douglas, K. M. (2020). Exposure to intergroup conspiracy theories promotes prejudice which spreads across groups. *British Journal of Psychology*, 111(1), 17–35. DOI 10.1111/bjop.12385.
37. Bierwiazzonek, K., Kunst, J. R., Pich, O. (2020). Belief in COVID-19 conspiracy theories reduces social distancing over time. *Applied Psychology: Health and Well-Being*, 12(4), 1270–1285. DOI 10.1111/aphw.12223.
38. Chen, X., Zhang, S. X., Jahanshahi, A. A., Alvarez-Risco, A., Dai, H. et al. (2020). Belief in a COVID-19 conspiracy theory as a predictor of mental health and well-being of health care workers in Ecuador: Cross-sectional survey study. *JMIR Public Health Surveill*, 6(3), e20737. DOI 10.2196/20737.
39. Pfefferbaum, B., North, C. S. (2020). Mental health and the COVID-19 pandemic. *New England Journal of Medicine*, 383(6), 510–512. DOI 10.1056/NEJMp2008017.
40. Cullen, W., Gulati, G., Kelly, B. D. (2020). Mental health in the COVID-19 pandemic. *QJM: An International Journal of Medicine*, 113(5), 311–312. DOI 10.1093/qjmed/hcaa110.
41. Flint, A. J., Bingham, K. S., Iaboni, A. (2020). Effect of COVID-19 on the mental health care of older people in Canada. *International Psychogeriatrics*, 32(10), 1113–1116. DOI 10.1017/S1041610220000708.
42. Newby, J. M., O’Moore, K., Tang, S., Christensen, H., Faasse, K. (2020). Acute mental health responses during the COVID-19 pandemic in Australia. *PLoS One*, 15(7), e0236562. DOI 10.1371/journal.pone.0236562.
43. Shigemura, J., Kurosawa, M. (2020). Mental health impact of the COVID-19 pandemic in Japan. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(5), 478–479. DOI 10.1037/tra0000803.
44. Goularte, J. F., Serafim, S. D., Colombo, R., Hogg, B., Caldieraro, M. A. et al. (2021). COVID-19 and mental health in Brazil: Psychiatric symptoms in the general population. *Journal of Psychiatric Research*, 132, 32–37. DOI 10.1016/j.jpsychires.2020.09.021.
45. Twenge, J. M., Joiner, T. E. (2020). Mental distress among U.S. adults during the COVID-19 pandemic. *Journal of Clinical Psychology*, 76(12), 2170–2182. DOI 10.1002/jclp.23064.
46. Horesh, D., Kapel Lev-Ari, R., Hasson-Ohayon, I. (2020). Risk factors for psychological distress during the COVID-19 pandemic in Israel: Loneliness, age, gender, and health status play an important role. *British Journal of Health Psychology*, 25(4), 925–933. DOI 10.1111/bjhp.12455.
47. Silva Moreira, P., Ferreira, S., Couto, B., Machado-Sousa, M., Fernández, M. et al. (2021). Protective elements of mental health status during the COVID-19 outbreak in the Portuguese population. *International Journal of Environmental Research and Public Health*, 18(4), 1–10. DOI 10.3390/ijerph18041910.
48. González-Sanguino, C., Ausín, B., Castellanos, M. Á., Saiz, J., López-Gómez, A. et al. (2020). Mental health consequences during the initial stage of the 2020 coronavirus pandemic (COVID-19) in Spain. *Brain, Behavior, and Immunity*, 87, 172–176. DOI 10.1016/j.bbi.2020.05.040.
49. Bäuerle, A., Steinbach, J., Schweda, A., Beckord, J., Hetkamp, M. et al. (2020). Mental health burden of the COVID-19 outbreak in Germany: Predictors of mental health impairment. *Journal of Primary Care & Community Health*, 11, 2150132720953682. DOI 10.1177/2150132720953682.
50. Kim, A. W., Nyengerai, T., Mendenhall, E. (2020). Evaluating the mental health impacts of the COVID-19 pandemic: Perceived risk of COVID-19 infection and childhood trauma predict adult depressive symptoms in urban South Africa. *Psychological Medicine*, 1, 1–13. DOI 10.1017/S0033291720003414.
51. El-Zoghby, S. M., Soltan, E. M., Salama, H. M. (2020). Impact of the COVID-19 pandemic on mental health and social support among adult Egyptians. *Journal of Community Health*, 45(4), 689–695. DOI 10.1007/s10900-020-00853-5.
52. Forte, G., Favieri, F., Tambelli, R., Casagrande, M. (2020). COVID-19 pandemic in the Italian population: Validation of a post-traumatic stress disorder questionnaire and prevalence of PTSD symptomatology. *International Journal of Environmental Research and Public Health*, 17(11), 4151. DOI 10.3390/ijerph17114151.

53. North, C. S., Surís, A. M., Pollio, D. E. (2021). A nosological exploration of PTSD and trauma in disaster mental health and implications for the COVID-19 pandemic. *Behavioral Sciences*, 11(1), 1–14. DOI 10.3390/bs11010007.
54. Alshehri, F. S., Alatawi, Y., Alghamdi, B. S., Alhifany, A. A., Alharbi, A. (2020). Prevalence of post-traumatic stress disorder during the COVID-19 pandemic in Saudi Arabia. *Saudi Pharmaceutical Journal*, 28(12), 1666–1673. DOI 10.1016/j.jsps.2020.10.013.
55. Jiang, H. J., Nan, J., Lv, Z. Y., Yang, J. (2020). Psychological impacts of the COVID-19 epidemic on Chinese people: Exposure, post-traumatic stress symptom, and emotion regulation. *Asian Pacific Journal of Tropical Medicine*, 13(6), 252–259. DOI 10.4103/1995-7645.281614.
56. Suzuki, K., Ohida, T., Kaneita, Y., Yokoyama, E., Miyake, T. et al. (2004). Mental health status, shift work, and occupational accidents among hospital nurses in Japan. *Journal of Occupational Health*, 46(6), 448–454. DOI 10.1539/joh.46.448.
57. Barkhordari, A., Malmir, B., Malakoutikhah, M. (2019). An analysis of individual and social factors affecting occupational accidents. *Safety and Health at Work*, 10(2), 205–212. DOI 10.1016/j.shaw.2019.01.002.
58. Egozi, L., Reiss-Hevlin, N., Dallahsheh, R., Pardo, A. (2021). Couriers' safety and health risks before and during the COVID-19 pandemic. *International Archives of Occupational and Environmental Health*, 95(3), 589–598. DOI 10.1007/s00420-021-01795-8.
59. Vally, Z., Helmy, M. (2021). The association between depressive symptomology, psychological burden related to COVID-19, and engagement in physical exercise among college students. *Frontiers in Psychiatry*, 12, 741964. DOI 10.3389/fpsy.2021.741964.
60. Hermassi, S., Hayes, L. D., Salman, A., Sanal-Hayes, N. E. M., Abassi, E. et al. (2021). Physical activity, sedentary behavior, and satisfaction with life of university students in Qatar: Changes during confinement due to the COVID-19 pandemic. *Front Psychol*, 12, 704562. DOI 10.3389/fpsyg.2021.704562.
61. Meyer, J. D., O'Connor, J., McDowell, C. P., Lansing, J. E., Brower, C. S. et al. (2021). High sitting time is a behavioral risk factor for blunted improvement in depression across 8 weeks of the COVID-19 pandemic in April–May 2020. *Frontiers in Psychiatry*, 12, 741433. DOI 10.3389/fpsy.2021.741433.
62. Greenberg, N., Docherty, M., Gnanapragasam, S., Wessely, S. (2020). Managing mental health challenges faced by healthcare workers during COVID-19 pandemic. *British Medical Journal (Clinical Research Edition)*, 368, m1211. DOI 10.1136/bmj.m1211.
63. Kar, S. K., Yasir Arafat, S. M., Kabir, R., Sharma, P., Saxena, S. K. (2019). Coping with mental health challenges during COVID-19. In: *Coronavirus disease 2019 (COVID-19)*, pp. 199–213. DOI 10.1007/978-981-15-4814-7\_16.