

Anxiety, depression and post-traumatic stress disorder among female UiTM handball athletes during COVID-19 Pandemic: A case study

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Abstract:

The COVID-19 pandemic has affected the athletes' social activity and management, especially during Movement Control Order (MCO). The preparation and schedules of the athletes were influenced by the problems and difficulties related to social distress, instability of the qualifying tournament and often refused access to a productive training environment, coaches, and teammates. It may cause disturbances in the mental health of the athletes. This study aimed to identify the anxiety level, post-traumatic stress disorder, and depression among female Universiti Teknologi MARA (UiTM) handball players during the COVID-19 pandemic. A cross-sectional research design was performed. A total of 110 UiTM handball players participated in the study. The Impact of Event Scale-Revised (IES-R) was used to measure post-traumatic stress disorder (PTSD). The Generalised Anxiety Disorder 7-items (GAD-7) and the Patient Health Questionnaire (PHQ-9) were used to measure the anxiety level and depression, respectively. The mean IES-R reported a score of 34.50 (SD=15.19), which exceeded the cutoff score of 25 for a diagnosis of post-traumatic stress disorder. From three dimensions of PTSD, the highest score was reported on avoidance [mean (SD) = 13.92 (6.42)], followed by intrusion [mean (SD) = 13.01 (7.57)], and hyperarousal [mean (SD) = 7.57 (4.73)]. Of 110 respondents, only 13.60% (n = 15) were normal, while 65.50% (n=95) has mild to severe anxiety. Depression reported by only 5.50% (n = 6) respondents were normal, while 94.50% (n = 104) had minimal to severe depression. In conclusion, the athletes' anxiety levels, post-traumatic stress disorder, and depression are affected during the COVID-19 pandemic. The restriction and fear that occur during pandemics may trigger PTSD among athletes. The anxiety and depression reported had affected general people, and the results among athletes were similar.

Keywords: - Post-traumatic stress disorder, Anxiety, Depression, COVID-19 pandemic

Introduction

At the end of 2019, an increasing trend of pneumonia cases was reported in Wuhan, China, and the cause was identified as coronavirus. Over a hundred thousand cases were reported worldwide, prompting the World Health Organization (WHO) to declare a 2019 coronavirus outbreak (Toresdahl & Asif, 2020). Physical distance is placed as one of the safety procedures to prevent the spread of infection. Indeed, related outbreaks of other recent infectious diseases, for example, Ebola and SARS, have led to no mass gathering, containment, and exclusion in the lack of vaccines or specific therapies, the only options to reduce global dissemination and prevent overloading the health system (Parnell et al., 2020). Studies by Montemurro, (2020) and Oliveira et al. (2018) suggested that a government should implement health precautions such as quarantine, lockdown and wearing a mask to stop the virus from spreading. However, it will have psychological and economic consequences. It is also a precaution to prevent athletes from contracting and spreading the virus (Wu & McGoogan, 2020).

Some studies reported that negative mental health such as depression and anxiety are triggered by people's changing living conditions and decreased social and physical interaction. Moreover, apart from friends and family, the isolation phase may trigger psychological consequences such as depression and anxiety (Brooks et al., 2020; Wong et al., 2005). A study by Toresdahl and Asif (2020) reports that the suspended seasons and cancellation of the competition due to the pandemic may have an effect on the stress, anxiety, and depression of the athletes. Mental health and self-management research has become essential during the uncertainty and anguish resulting from a worldwide pandemic (Knowles et al., 2021). The recent outbreaks due to COVID-19 have been reported to have the most significant psychosocial impact (Paredes et al., 2021). Recent research demonstrates that the COVID-19 pandemic effect negative psychological health, such as stress-related symptoms, social isolation, uncertainty, and fear (Abarca-Gómez et al., 2017; Duan & Zhu, 2020; Satici, Gocet-Tekin, et al., 2020). Giallorardo et al., (2020) reported in their study that the impact of the pandemic on mental health should be studied before adequate mental health treatments can be provided. The perceived threat of a pandemic causes uncertainty and dread, leading to increased stress and susceptibility, which negatively

influences personal mental health. Individuals' anxieties about their future condition are also heightened, leading to unfavorable views of future outcomes (Dong & Peng, 2013; Paredes et al., 2021).

The COVID-19 pandemic affected many financial sectors in society. One of the occupational areas impacted by the pandemic is the world of competitive sports, including professional, semiprofessional, and highly involved athletes. Job uncertainty is likely to significantly impact athletes' and coaches' mental health (Bentzen et al., 2020; Håkansson et al., 2021). Regardless of the sport, athletes' physical activity and training were restricted due to the COVID-19 epidemic. When the structure and timetable of training are altered, the athlete's physical state will be influenced. Furthermore, the cancellation of sporting events might have a negative impact on their athletes' social and economic lives (Cosma et al., 2021; Schinke et al., 2020). The unexpected national lockdown and suspension of competitions due to the outbreaks have created plenty of stresses that have harmed not just amateur and professional players' personal lives but also their sporting careers (Knowles et al., 2021). Before the pandemic, mental health issues such as depression and anxiety were mostly reported to be linked with de-selection, injury and early retirement (Appaneal et al., 2009; Rice et al., 2016; Snaith, 2003). However, the influence factors differed during the pandemic.

Some studies report the benefit of involvement in sports may be linked to health and well-being. However, the pandemic may have a long-term effect on health and service sectors such as sports. The athletes faced similar conditions as other people, such as feeling anxiety, stress, and fear due to the situation (Oliveira et al., 2018). Therefore, sports medicine professionals published guidelines for helping athletes maintain their mental status by doing routine exercises and contacting the coach or teammates by phone and online. These are important to reduce the risk of anxiety and depression among athletes (Hull et al., 2020; Mehrosafar et al., 2020; Oliveira et al., 2018)

PTSD is a severe and chronic mental condition that arises after physical, mental, or environmental trauma (Cahill & Pontowski, 2005). Traumatic stress is an acute feeling of powerlessness and anxiety that is seen as a danger to the person's or others' bodily integrity. Athletes may be traumatized before (during youth), during (during sports involvement), or after (during their athletic careers) (Aron et al., 2019). PTSD has been reported to be linked to epidemic illnesses (Lee et al., 2018; Şenışık et al., 2021). Post-traumatic stress symptoms increased because of isolation, apart from friends and family, and unfavorable feelings toward themselves and others' health, during the pandemic era (Hawryluck et al., 2004; Lee et al., 2018). Qiu et al. (2020) indicated that psychological distress impacted 35% of the population; women aged 18 to 30 years or over 60 years were more susceptible to stress and more prone to developing PTSD.

Malaysia became one of the Asian countries hit by a long-term and extensive coronavirus outbreak. This scenario has come as a big shock to the Malaysian government, administration institutions, businesses, and ordinary Malaysians. The impact of the pandemic on social activity and organization is undeniable, even though it is projected to supply it for a period of time. Problems and challenges connected to social hardship, career harm, qualifying tournament volatility, and rare, inadequate, and frequently no exposure to effective training settings, coaches, and teammates affected the world of sport and players' lives, preparation, and schedules (Schinke et al., 2020).

Handball is a team sport that involves the use of a ball, a court, and a goal post. Because the game includes player-to-team contact, training alone is difficult for players' colleagues. As a result of the quarantine, the athletes are unable to practice with their teammates as usual. When opposed to individual athletes, a team sport is easier to get mental health since team sports require social contact (Lai et al., 2020).

Staying at home for an extended amount of time, due to isolation, is likely to have a detrimental impact on athletes' mental health. However, to the best of our knowledge, research addressing the extent to which athletes' mental health is impacted by isolation is not yet completely available, with the exception of surveys (Şenışık et al., 2021). The impact of athletes losing sports owing to COVID-19 is unknown; however, there is some fascinating information. A study on specific college athletes affected by COVID-19 is important compared to the broader college student population (Garver et al., 2021). Therefore, this study aimed to identify the anxiety level, depression, and post-traumatic stress disorder among female UiTM handball players during the COVID-19 pandemic.

Material and methods

A cross-sectional research design was utilized to evaluate the study subjects' outcomes and exposures simultaneously. It is observational research in which data from a population is analyzed at a specific moment in time.

Participants

The respondents included female handball athletes from UiTM Student Sports Carnival (KARISMA) 2019. According to information obtained from UiTM Malaysia's handball management, 116 female handball athletes competed in the KARISMA 2019 event at UiTM Selangor, representing 9 UiTM campuses (Johor, Melaka, Negeri Sembilan, Selangor, Shah Alam, Perak, Perlis, Terengganu, and Kelantan). A total of 92 athletes were sampled from the total population (Krejcie & Morgan, 1970). To avoid any dropouts, a 20% additional number of respondents added (Enders, 2003) to the number of samples was introduced. As a result, the total sample size was 110.

Measurement

The instrument used in this study consisted of a series of questionnaires distributed through an online method. It consisted of four sections namely demographic profile, the Impact of Event Scale-Revised (IES-R) to measure psychological distress disorder, Generalized Anxiety Disorder 7-item (GAD-7) to measure anxiety level and Patient Health Questionnaire-9 (PHQ-9) to measure depression. A demographic profile asks for the respondent's profile such as age, gender, and level of education. *Impact of Event Scale-Revised (IES-R)*: The questionnaire measures PTSD, which analyzes the discomfort experience after exposure to severe life events and asks how an individual was impacted in the previous 7 days. It was reported reliable and valid to screen the respondents during a pandemic (Aljaberi et al., 2021). The questionnaire, which includes 22 questions, consists of 3 dimensions, namely, Intrusion (INT), avoidance (AVD), and hyperarousal (HYP) (Weiss, 2007). It has five-point Likert scale ("0 = not at all", "1 = a little bit", "2 = moderately", "3 = quite a bit" and "4 = extremely"). The scoring range is 0 – 88. On this questionnaire, points above 24 can be very important for the respondent because she/he can know they are having PTSD (Asukai et al., 2002). *Generalized Anxiety Disorder 7-item (GAD-7)*: In this section, seven questions measure anxiety. A scale of (0 = “not at all,” 1 = “several days” 2 = “more than half of the days,” and 3 = “nearly every day”) was used to identify how often respondents experienced each symptom in the past 2 weeks. Scores were summed to create a total anxiety score. The scores level were 5 for mild, 10 for moderate, and 15 for severe levels of anxiety. Cases of GAD may have a score of 10 and more (Spitzer et al., 2006). Löwe et al. (2008) reported the tool was valid and reliable in assessing GAD among adults (Cronbach's alpha = 0.89). *Patient Health Questionnaire (PHQ-9)*: The questionnaire was used to measure the level of depression among respondents. The Likert scale is the same as the GAD-7 questionnaire ("0 = not at all sure," "1 = several days," "2 = one half the days," and "3 = nearly every day"). It has 9 items, and a score range of 0 – 27. 0 is normal, 1 – 4 is minimal depression, 5 – 9 is mild depression, 10 – 14 is moderate depression and 15 – 19 is moderately severe anxiety and 20 – 27 is severe depression (Asukai et al., 2002).

Statistical Analysis

The data was analyzed using the IBM SPSS version 25.0. The significance level was set up at $p \leq 0.05$. The descriptive statistic was used to identify the anxiety level, depression, and psychological distress among female UiTM handball players during the COVID-19 pandemic. The results were measured using mean, standard deviation (SD), frequency (n), and percentage (%).

Results

Table 1 presents the demographic profile of the respondents. It showed that majority of the respondents were in the age group of 18-20 years old (n = 58, 52.70%). Both numbers of respondents are equal for diploma and degree.

Table 1. Descriptive results of demographic profile

Variables		Frequency (n)	Percentage (%)
Age in groups	18-20 years old	58	52.70
	21-23 years old	40	36.40
	More than 23 years old	12	10.90
Highest level of Education	Diploma	55	50.00
	Degree	55	50.00

Table 2 reported the post-traumatic stress score among respondents. From three dimensions of PTSD, the highest score is reported on avoidance [mean (SD) = 13.92 (6.42)], followed by intrusion [mean (SD) = 13.01 (7.57)] and hyperarousal [mean (SD) = 7.57 (4.73)]. The total score of 34.50 (SD =15.19) indicates that the respondents are of concern about PTSD.

Table 2. Descriptive results of post-traumatic stress disorder (PTSD)

Variables		Mean	SD
Post-traumatic Disorder (PTSD)	Stress		
	Intrusion	13.01	7.57
	Avoidance	13.92	6.42
	Hyperarousal	7.57	4.73
	Total score	34.50	15.19

The results in Table 3 and Figure 1 reported that only 13.60% (n = 15) of respondents were normal, which does not represent anxiety, while the majority of the respondents were reported to have mild to severe levels of anxiety [mild; n = 55 (50.00%), moderate; n = 27 (24.50 %), severe; n = 13 (11.80 %)]. The level of depression reported in Table 3 and Figure 2 showed that the majority of the respondents experience mild depression (n = 38, 34.50 %), followed by minimal depression (n = 31, 28.20 %), moderate depression (n = 21, 19.10 %), moderate-severe depression (n = 10, 9.10 %), and severe depression (n = 4, 3.6 %). Only 13.60% (n = 15) of respondents reported normal conditions during the pandemic.

Table 3. Descriptive results of the level of anxiety and depression.

Variables		Frequency (n)	Percentage (%)
Level of anxiety	Normal	15	13.60
	Mild anxiety	55	50.00
	Moderate anxiety	27	24.50
	Severe anxiety	13	11.80
Level of depression	Normal	6	5.50

Minimal Depression	31	28.20
Mild Depression	38	34.50
Moderate Depression	21	19.10
Moderately Severe Depression	10	9.10
Severe Depression	4	3.60

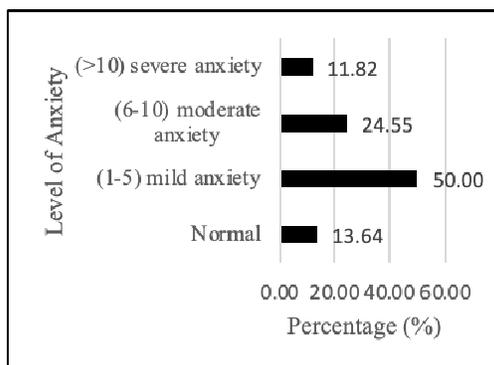


Figure 1. Level of anxiety

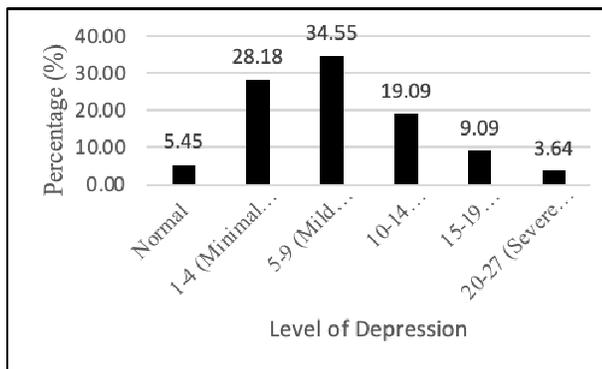


Figure 2. Level of depression

Discussion

The respondents are female handball athletes, and most of them suffer from mental health issues, according to the data. A study by Weiss (2007) reported that female athletes were shown to be more distressed than male athletes. Female athletes have previously been identified as an at-risk subgroup for mental health issues (Balcombe & de Leo, 2020; *Gender and Mental Health*, 2002; Knowles et al., 2021; Parm et al., 2021).

Many studies reported that people who are actively involved in physical activity and exercise can enhance their mental health by reducing symptoms of depression, anxiety, and post-traumatic stress symptoms, especially among athletes (LeardMann et al., 2011; Mammen & Faulkner, 2013; Schuch et al., 2019). Şenişik et al. (2021) also reported regular physical exercise caused the mental diversion, decreasing post-traumatic stress symptoms. However, due to MCO, the responders have difficulty becoming active, which may affect their mental health conditions.

The total score of PTSD reported by the respondents is in clinical concern. Those who do not have complete PTSD but have high scores will have partial PTSD or at least some of the symptoms (Asukai et al., 2002). The development of PTSD symptoms following exposure to one or more traumatic incidents is known as post-traumatic stress disorder (PTSD) (Weiss, 2007). The pandemic triggered by COVID-19 is unlike any other past catastrophic events, such as earthquakes or tsunamis, from a medical and societal perspective (Morganstein & Ursano, 2020). According to this study, the most stressful occurrence during a pandemic is a total lockdown, also known as Movement Control Order (MCO). Because this is the first time the respondent has gone through MCO, the results revealed that they are experiencing PTSD symptoms. When someone lives freely without constraint and then is suddenly restricted, it can be traumatic for those who are exposed to it. The American Psychiatric Association (2013) reported that reexperiencing-based fear, emotional and behavioral changes, dysphoric moods, and negative cognitions are all possible symptoms of PTSD.

The respondents reported a high level of stimulus avoidance for post-traumatic stress disorder. Many respondents continued to engage in avoidance behaviors following quarantine, such as avoiding direct contact with crowds (Brooks et al., 2020). It takes several months to go back to normal. The respondents attempt to avoid remembering the lockdown scenario since it affected their psychological health.

Most of the study respondents were classified as having mild to severe anxiety. The athletes that were screened reported that the pandemic impacted them psychologically. A study from Italy by di Fronso et al. (2020) also reported the same finding among their athletes during an early pandemic. These variables have a greater impact on female athletes (di Fronso et al., 2020). Injury may have a serious impact on players' mental health before a pandemic, causing depression, anxiety, and uncertainty or loss of sports identity. Now, isolation and a sense of loss of opportunity can worsen these symptoms and impact one's identity (Chan & Grossman, 1988; Garver et al., 2021; Mainwaring et al., 2010; Sheinbein, 2016; Wiseman et al., 2013). During the COVID-19 pandemic, anxiety has the greatest influence on mental health. The depression and anxiety increased due to lack of community assistance and a regular training regimen (Parm et al., 2021; Toresdahl & Asif, 2020). Anxiety is a normal response to stressful circumstances, and traumatic incidents like COVID-19 remind people of the potential of death (Roy et al., 2020).

A recent finding showed that most handball players experience minimal to severe depression. It was consistent with the study which reported that 52% of semi-elite and 50% of elite South African athletes felt depressed and had difficulty staying motivated during the pandemic (Pillay et al., 2020). A study by the National Collegiate Athletic Association (NCAA) also reported that during the onset of the pandemic, mental distress was

high including feelings of depression (Garver et al., 2021; *National Collegiate Athletic Association. NCAA Student-Athlete Well-Being Study*, 2020).

The results of a recent study are consistent with the finding of Duan & Zhu (2020) and Satici, Saricali, et al. (2020), which reported that the conditions and circumstances underlying the COVID-19 pandemic (e.g., social isolation, uncertainty, fear) exacerbate stress-related symptoms, negatively impacting mental health. Several studies reported the occurrence of higher levels of depression, anxiety, isolation, post-traumatic stress, frustration, sadness and anger- hostility (Giallonardo et al., 2020; Liu et al., 2020; María del Carmen et al., 2020; Roy et al., 2020).

Conclusions

This study aimed to measure PTSD, anxiety, and depression among college athletes. PTSD reported before, is linked to epidemic illnesses. The restriction and fear that occur during the pandemic may trigger PTSD among athletes. Furthermore, the anxiety and depression reported had affected general people, and the results among athletes may be similar. From the finding, it is reported that the COVID-19 pandemic give an impact on the PTSD, anxiety, and depression of UiTM female handball athletes. Most athletes experience PTSD, anxiety, and depression. The restriction during MCO limits the involvement of the athletes to be active. The future study suggests including variables such as the activity done during MCO and the contribution of the coaches to determine its effect on mental health due to the restriction during the pandemic. This study was also limited to a group of handball athletes, which results in limited interpretation of sports athletes. Therefore, future studies recommend dispersing the population to more than one sport.

Conflicts of interest - The authors declare no conflict of interest for the research.

References:

- Aljaberi, M. A., Alareqe, N. A., Qasem, M. A., Alsalahi, A., Noman, S., Al-Tammemi, A., & Mohamed Ibrahim, M. I. (2021). Rasch Modeling and Multilevel Confirmatory Factor Analysis for the Usability of the Impact of Event Scale-Revised (IES-R) During the COVID-19 Pandemic. *SSRN Electronic Journal*.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*. (5th edition). American Psychiatric Association.
- Appaneal, R. N., Levine, B. R., Perna, F. M., & Roh, J. L. (2009). Measuring postinjury depression among male and female competitive athletes. *Journal of Sport and Exercise Psychology*, 31(1), 60–76.
- Aron, C. M., Harvey, S., Hainline, B., Hitchcock, M. E., & Reardon, C. L. (2019). Post-traumatic stress disorder (PTSD) and other trauma-related mental disorders in elite athletes: A narrative review. *British Journal of Sports Medicine*, 53(12), 779–784. <https://doi.org/10.1136/bjsports-2019-100695>
- Asukai, N., Kato, H., Kawamura, N., Kim, Y., Yamamoto, K., Kishimoto, J., Miyake, Y., & Nishizono-Maher, A. (2002). Reliability and validity of the Japanese-language version of the Impact of Event Scale-Revised (IES-R-J): Four studies of different traumatic events. *Journal of Nervous and Mental Disease*, 190(3), 175–182.
- Balcombe, L., & de Leo, D. (2020). Psychological screening and tracking of athletes and digital mental health solutions in a hybrid model of care: Mini review. *JMIR Formative Research*, 4(12), e22755.
- Bentzen, M., Kenttä, G., Richter, A., & Lemyre, P. N. (2020). Impact of job insecurity on psychological welland ill-being among high performance coaches. *International Journal of Environmental Research and Public Health*, 17(19), 1–15. <https://doi.org/10.3390/ijerph17196939>
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *Lancet*, 395(10227), 912–920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Cahill, S. P., & Pontoski, K. (2005). Post-traumatic stress disorder and acute stress disorder I: their nature and assessment considerations. *Psychiatry*, 2(4), 14–25.
- Chan, C. S., & Grossman, H. Y. (1988). Psychological Effects of Running loss on consistent runners. *Perceptual and Motor Skills*, 66(1969), 875–883.
- Cosma, G. A., Chiracu, A., Stepan, A. R., Cosma, M. A., Nanu, M. C., Voinea, F., Bibi, K. W., Păunescu, C., & Haddad, M. (2021). Covid-19 pandemic and quality of life among Romanian athletes. *International Journal of Environmental Research and Public Health*, 18(8). <https://doi.org/10.3390/ijerph18084065>
- di Fronso, S., Costa, S., Montesano, C., Di Gruttola, F., Ciofi, E. G., Morgilli, L., Robazza, C., & Bertollo, M. (2022). The effects of COVID-19 pandemic on perceived stress and psychobiosocial states in Italian athletes. *International Journal of Sport and Exercise Psychology*, 20(1), 79-91.
- Dong, Y., & Peng, C. Y. (2013). *Principled missing data methods for researchers*. SpringerPlus, December(1),222.
- Duan, L., & Zhu, G. (2020). Psychological interventions for people affected by the COVID-19 epidemic. *Lancet Psychiatry*, 7(4), 300–302. [https://doi.org/10.1016/S2215-0366\(20\)30073-0](https://doi.org/10.1016/S2215-0366(20)30073-0)

- Enders, C. K. (2003). Using the expectation-maximization algorithm to estimate coefficient alpha for scales with item-level missing data. *Psychological Methods*, 8(3), 322–337. <https://doi.org/10.1037/1082-989X.8.3.322>
- Garver, M. J., Gordon, A. M., Philipp, N. M., Huml, M. R., & Wakeman, A. J. (2021). Change-event steals “athlete” from “college athlete”: perceived impact and depression, anxiety, and stress. *Journal of Multidisciplinary Healthcare, Volume 14*(June), 1873–1882. <https://doi.org/10.2147/jmdh.s320243>
- Gender and Mental Health. (2002). World Health Organization. https://www.who.int/gender/other_health/genderMH.pdf
- Giallonardo, V., Sampogna, G., Del Vecchio, V., Luciano, M., Albert, U., Carmassi, C., Carrà, G., Cirulli, F., Dell’Osso, B., Nanni, M. G., Pompili, M., Sani, G., Tortorella, A., Volpe, U., & Fiorillo, A. (2020). The impact of quarantine and physical distancing following covid-19 on mental health: Study protocol of a multicentric italian population trial. *Frontiers in Psychiatry*, 11(June), 533.
- Håkansson, A., Moesch, K., Jönsson, C., & Kenttä, G. (2021). Potentially prolonged psychological distress from postponed Olympic and paralympic games during COVID-19—career uncertainty in elite athletes. *International Journal of Environmental Research and Public Health*, 18(1), 1–9.
- Hawryluck, L., Gold, W. L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases*, 10(7), 1206–1212.
- Knowles, C., Shannon, S., Prentice, G., & Breslin, G. (2021). Comparing mental health of athletes and non-athletes as they emerge from a COVID-19 pandemic lockdown. *Frontiers in Sports and Active Living*, 3(May), 612532. <https://doi.org/10.3389/fspor.2021.612532>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607–610. <https://doi.org/10.1177/001316447003000308>
- Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Wu, J., Du, H., Chen, T., Li, R., Tan, H., Kang, L., Yao, L., Huang, M., Wang, H., Wang, G., Liu, Z., & Hu, S. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open*, 3(3), e203976.
- Leardmann, C. A., Kelton, M. L., Smith, B., Littman, A. J., Boyko, E. J., Wells, T. S., Smith, T. C. & Millenium Cohort Study Team (2011). Prospectively assessed posttraumatic stress disorder and associated physical activity. *Public Health Reports*, 126(3), 371–383. <https://doi.org/10.1177/003335491112600311>
- Lee, S. M., Sub Kang, W., Cho, A.-R., Kim, T., & Park, J. K. (2018). The psychological impact of 2015 MERS. *Comprehensive Psychiatry*, 87(January), 123–127.
- Liu, C. H., Zhang, E., Tin, G., Ba, W., & Hyun, S. (2020). *Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ’ s public news and information . January.*
- Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the generalized anxiety disorder screener (GAD-7) in the general population. *Medical Care*, 46(3), 266–274. <https://doi.org/10.1097/MLR.0b013e318160d093>
- Mainwaring, L. M., Hutchison, M., Bisschop, S. M., Comper, P., & Richards, D. W. (2010). Emotional response to sport concussion compared to ACL injury. *Brain Injury*, 24(4), 589–597.
- Mammen, G., & Faulkner, G. (2013). Physical activity and the prevention of depression: A systematic review of prospective studies. *American Journal of Preventive Medicine*, 45(5), 649–657.
- María del Carmen, P. F., María del Mar, M. J., Martínez, Á. M., & Gázquez Linares, J. J. (2020). Threat of COVID-19 and emotional state during quarantine: Positive and negative affect as mediators in a cross-sectional study of the Spanish population. *PLoS ONE*, 15(6), 1–11. <https://doi.org/10.1371/journal.pone.0235305>
- Montemurro, N. (2020). The emotional impact of COVID-19: From medical staff to common people. *Brain, Behavior, and Immunity*, 87(March), 23–24. <https://doi.org/10.1016/j.bbi.2020.03.032>
- Morganstein, J. C., & Ursano, R. J. (2020). Ecological disasters and mental health: causes, consequences, and interventions. *Frontiers in Psychiatry*, 11(February), 1. <https://doi.org/10.3389/fpsvt.2020.00001>
- National Collegiate Athletic Association. *NCAA Student-Athlete COVID-19 Well-being Survey*. (2020). https://ncaaorg.s3.amazonaws.com/research/other/2020/2020RES_NCAASACOV19SurveyReport.pdf
- National Collegiate Athletic Association. *NCAA Student-Athlete Well-Being Study*. (2020). <https://www.ncaa.org/about/resources/research/ncaa-student-athlete-covid-19-well-being-study>
- NCD Risk Factor Collaboration (NCD-RisC). (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: A pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *Lancet*, 390(10113), 2627–2642.
- Oliveira, S., Oliveira, S., Cunha, M., Rosado, A., & Ferreira, (2018). *Challenges, burden and emotional impact on Portuguese athletes during COVID-19 pandemic Retos e impacto emocional de la pandemia en los deportistas portugueses durante la pandemia de COVID-19 Os desafios e o impacto emocional nos atletas portugueses durante a pandemia COVID-19* (Vol. 22). <http://revistas.um.es/cpd>

- Paredes, M. R., Apaolaza, V., Fernandez-Robin, C., Hartmann, P., & Yañez-Martinez, D. (2021). The impact of the COVID-19 pandemic on subjective mental well-being: The interplay of perceived threat, future anxiety and resilience. *Personality and Individual Differences*, 170(October 2020), 110455.
- Parm, Ü., Aluoja, A., Tomingas, T., & Tamm, A. L. (2021). Impact of the covid-19 pandemic on Estonian elite athletes: Survey on mental health characteristics, training conditions, competition possibilities, and perception of supportiveness. *International Journal of Environmental Research and Public Health*, 18(8).
- Parnell, D., Widdop, P., Bond, A., & Wilson, R. (2020). COVID-19, networks and sport. *Managing Sport and Leisure*, 0(0), 1–7. <https://doi.org/10.1080/23750472.2020.1750100>
- Pillay, L., Janse van Rensburg, D. C. C., Jansen van Rensburg, A., Ramagole, D. A., Holtzhausen, L., Dijkstra, H. P., & Cronje, T. (2020). *Nowhere to hide: The significant impact of coronavirus disease 2019 (COVID-19) measures on elite and semi-elite South African athletes*. *Journal of Science and Medicine in Sport*, 23(7), 670–679. <https://doi.org/10.1016/j.jsams.2020.05.016>.
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *General Psychiatry*, 33(2), e100213. <https://doi.org/10.1136/gpsych-2020-100213>
- Rice, S. M., Purcell, R., De Silva, S., Mawren, D., McGorry, P. D., & Parker, A. G. (2016). The mental health of elite athletes: a narrative systematic review. *Sports Medicine*, 46(9), 1333–1353.
- Roy, D., Tripathy, S., Kumar, S., & Sharma, N. (2020). Study of knowledge, attitude, anxiety and perceived mental healthcare need in Indian. *Asian Journal of Psychiatry Journal*, January.
- Satici, B., Gocet-Tekin, E., Deniz, M. E., & Satici, S. A. (2021). Adaptation of the fear of COVID-19 scale: Its association with psychological distress and life satisfaction in Turkey. *International Journal of Mental Health and Addiction*, 19(6), 1980–1988. <https://doi.org/10.1007/s11469-020-00294-0>
- Satici, B., Saricali, M., Satici, S. A., & Griffiths, M. D. (2020). Intolerance of uncertainty and mental wellbeing: serial mediation by rumination and fear of COVID-19. *International Journal of Mental Health and Addiction*, 1-12. <https://doi.org/10.1007/s11469-020-00305-0>
- Schinke, R., Papaioannou, A., Henriksen, K., Si, G., Zhang, L., & Haberl, P. (2020). Sport psychology services to high performance athletes during COVID-19. *International Journal of Sport and Exercise Psychology*, 18(3), 269–272. <https://doi.org/10.1080/1612197X.2020.1754616>
- Schuch, F. B., Stubbs, B., Meyer, J., Heissel, A., Zech, P., Vancampfort, D., Rosenbaum, S., Deenik, J., Firth, J., Ward, P. B., Carvalho, A. F., & Hiles, S. A. (2019). Physical activity protects from incident anxiety: A meta-analysis of prospective cohort studies. *Depression and Anxiety*, 36(9), 846–858.
- Şenışık, S., Denerel, N., Köyağasioğlu, O., & Tunç, S. (2021). The effect of isolation on athletes' mental health during the COVID-19 pandemic. *Physician and Sportsmedicine*, 49(2), 187–193.
- Sheinbein, S. (2016). Psychological effect of injury on the athlete: a recommendation for psychological intervention. *AMAA Journal*, 29(3), 8–10.
- Snaith, R. P. (2003). The hospital anxiety and depression scale. *Health and Quality of Life Outcomes*, 1, 29.
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097.
- Toresdahl, B. G., & Asif, I. M. (2020). Coronavirus disease 2019 (COVID-19): considerations for the competitive athlete. *Sports Health*, 12(3), 221–224. <https://doi.org/10.1177/1941738120918876>
- Weiss, D. S. (2007). The impact of event scale: revised. *Cross-Cultural Assessment of Psychological Trauma and PTSD*, 19, 219–238. https://doi.org/10.1007/978-0-387-70990-1_10
- Wiseman, T., Foster, K., & Curtis, K. (2013). Mental health following traumatic physical injury: An integrative literature review. *Injury*, 44(11), 1383–1390. <https://doi.org/10.1016/j.injury.2012.02.015>
- Wong, T. W., Yau, J. K. Y., Chan, C. L. W., Kwong, R. S. Y., Ho, S. M. Y., Lau, C. C., Lau, F. L., & Lit, C. H. (2005). The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. *European Journal of Emergency Medicine*, 12(1), 13–18.
- Wu, Z., & McGoogan, J. M. (2020). Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) Outbreak in China. *JAMA*, 323(13), 1239-1242. <https://doi.org/10.1001/jama.2020.2648>