

The Impact of COVID-19 pandemic on addictive behaviors: an integrative review

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Abstract

Addictive behaviors and their impacts have been widely explored. Going through a pandemic moment requires further research since crisis situations involve higher propensity to dependency. The aim of this integrative review was to identify studies that have been conducted so as to explore behaviors related to brain's reward system in a pandemic period, which include substance addiction, internet addiction, gaming and other overusing behaviors. In order to accomplish our objective an integrative search was conducted in CAPES periodicals. Some inclusion and exclusion criteria were used to select the studies and in total (N=12) were explored independently. The results showed that there is an increasingly concern about health care systems, especially for those addicted to substances who need daily support, since addictions habits may have also increased. Behavioral addictions also increased and were exploited in some studies, especially those related to technologies, such as gaming and smartphone usage.

Keywords: Covid-19; addiction; behavior; mental health.

Resumo

O impacto da pandemia COVID-19 em comportamentos aditivos: uma revisão integrativa. Comportamentos aditivos e seus impactos têm sido amplamente explorados. Passar por um momento de pandemia requer ainda mais pesquisas, pois situações de crise envolvem maior propensão a dependências. O objetivo desta revisão foi identificar estudos conduzidos que exploraram comportamentos relacionados ao sistema de recompensa cerebral em momentos de pandemia, incluindo, adição a substâncias, adição a tecnologias, jogos e outros comportamentos excessivos. Buscando alcançar nossos objetivos, uma pesquisa integrativa foi conduzida nos periódicos da CAPES. Alguns critérios de inclusão e exclusão foram utilizados para selecionar os estudos, e, no total, (N=12) foram explorados independentemente. Os resultados mostraram que existe grande preocupação com relação aos sistemas de saúde, principalmente, para as pessoas que são adictas a substâncias e necessitam de suporte diário, devido ao aumento nos hábitos de adição. Comportamentos aditivos também intensificaram e foram explorados em alguns estudos, especialmente aqueles relacionados às tecnologias, como os jogos e o uso do smartphone.

Palavras-chave: Covid-19; adição; comportamento; saúde mental.

Resumen

El impacto de la pandemia COVID-19 en las conductas adictivas: una revisión integrativa. Las conductas adictivas y su impacto han sido ampliamente explorados. Pasar por una pandemia requiere más investigación, pues las situaciones de crisis implican una mayor propensión a la dependencia. El objetivo de esta revisión fue identificar los estudios realizados que exploran comportamientos relacionados con el sistema de recompensa del cerebro durante una pandemia: adicción a sustancias, adicción a Internet, juegos de azar, entre otras. Se llevó a cabo una búsqueda integrativa en las publicaciones de revistas CAPES utilizando algunos criterios de inclusión y exclusión, y se estudiaron en total (N=12) de forma independiente. Los resultados mostraron que existe una preocupación cada vez mayor por los sistemas de atención de la salud, especialmente para adictos a sustancias que necesitan apoyo diario, debido al posible aumento de los hábitos adictivos. Las adicciones comportamentales relacionadas con tecnologías también aumentaron, especialmente las relacionadas con los juegos y el uso de teléfonos inteligentes.

Palabras clave: Covid-19; adicción; comportamiento; salud mental.

Coronavirus disease (COVID-19) is an infectious respiratory illness which has quickly spread worldwide through secretion inhalation and close contact (Hui et al., 2020; Prajapat et al., 2020). Fear, worry, stress and increases in levels of anxiety are common responses to threats and crisis periods, especially when humans face uncertainties, high unemployment rates, lack of physical contact, changes in routines and continuous adaptation to the new scenario (Cao et al., 2020; Sargent-Cox, Butterworth, & Anstey, 2011; World Health Organization [WHO], 2020a).

Currently, the entire world has faced impacts on social, health and economic levels, once millions of people have been put in lockdown, flights have been canceled, economic activities have stopped and ones have to use masks on their daily basis (Dignum et al., 2020; Saadat, Rawtani, & Hussain, 2020). Beyond these adaptations it is known that negative life events, such as a pandemic time, may be connected to the development and maintenance of addictions (Zilberman, Yadid, Efrati, & Rassovsky, 2019).

Some vulnerability factors for addictive behaviors in the pandemic are related to the high occupancy of the health system due to COVID-19 and consequent difficulty in giving care to patients who suffer from addiction, which includes those dependent on substances and other behavioral dependencies (Arya & Gupta, 2020; Kar et al., 2020; Lima et al., 2020; Volkow, 2020). Behavioral addictions such as internet gaming disorder, gambling, internet addiction and substance use have increased during pandemic time due to the necessity of wellbeing (Kar et al., 2020; King, Delfabro, Billieux, & Potenza, 2020; Rehm et al., 2020; Volkow, 2020).

This mechanism is related to the brain reward system once people would rather have immediate satisfaction of needs instead of the accomplishment of long term goals (Koehler et al., 2013). The susceptibility to addictions occurs due to hypoactive reward systems in the prefrontal cortex and the use is needed so as to release more dopamine and provoke a greater sense of pleasure (Koehler et al., 2013; Petry et al., 2018).

Recognized in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as substance-related disorders and featured by having the presence of a group of cognitive, behavioral and physiological symptoms, addictive behaviors may affect one's lives in different areas (American Psychological Association [APA], 2013). Consequences caused by addictive behaviors might be found in decreasing in academic motivation or performance (Valkov, 2018), impulsivity (Stenason & Vernon, 2016), depressive symptoms (Choi et al., 2019),

sleeping problems (Weinstein, Yaacov, Manning, Danon, & Weizman, 2015), compulsive behaviors (Perales et al., 2020), anxiety (Gholamian, Shahnazi, & Hassanzadeh, 2017), and several other issues.

Considerable studies have investigated the consequences caused by substance addiction and other behavioral addictions in different groups from different development stages, including children, adolescents and adults (Fumero, Marrero, Voltes, & Peñate, 2018; Nahas, Hlais, Saberian, & Antoun, 2018; Valkov, 2018; Weinstein et al., 2015; Wilson et al., 2018). Among the groups, the adolescence is seen as the most vulnerable to addictions, since they have been through a period of intense changes that may result in risk behaviors due to the functioning of the mesolimbic dopamine system, becoming more sensitive and motivated to receiving rewards (Cerniglia et al., 2017; Wood, Dawe, & Gullo, 2013).

Based on these assumptions this integrative review is guided in order to answer the following question: What impacts does the current pandemic situation have on the addiction process and what studies have been published recently addressing this relationship?

Method

This review was conducted based on studies that were published which aimed to investigate the relation between COVID-19 pandemic and addictive behaviors patterns. In order to accomplish our aims, an integrative review was chosen due to its potential to presenting comprehensive understanding of relevant issues, summarizing available research about a topic and directing the practice based on scientific knowledge (Souza, Silva, & Carvalho, 2010; Whittemore & Knafl, 2005).

The integrative review was conducted following the steps previously defined for this sort of methodology. Initially, the descriptors COVID-19 and addiction were defined, then, in order to identify, locate and acquire the publications of interest, the Journals portal of the Coordination for the Improvement of Higher Education Personnel (CAPES) was accessed. Some searching filters were added, such as publication date, language, peer-reviewed journals and articles.

Some inclusion and exclusion criteria were formulated. Inclusion criteria were that the studies should have been published from 2019 to 2020, they should have been classified as articles and, moreover, should have been peer reviewed, and should mention pandemic and addiction. Exclusion criteria were that the study should have content

related to the subject chosen. To be included, all of them should have mentioned addictive behaviors and COVID-19. All papers that focused on other kinds of pandemic or the development of scales and instruments were excluded.

In the initial screening, only the abstracts of the articles were read and, if the data were not enough, the methods and results were also accessed. All of the accepted articles, those which met the criteria, were read and analyzed independently. After inspecting the selected articles independently, they were all placed in a table (Table 1) indicating the title of the study, year of publishing, thematic and considerations.

Results and discussion

The research was conducted in May 2020 at CAPES periodicals. COVID-19 and addiction were used as searching terms and in the initial screening 135 studies were found. After applying the filter publication year, the number of studies reduced to 68. After that, the filter for articles was selected and the number of studies totalized 41. The last filter was the peer reviewed, and the result was the availability of 29 papers. From these 29, the reading of the abstracts was performed and 17 were excluded because they focused on the development and validity of instruments and others pandemics, such as Ebola. In total 12 studies were analyzed independently. The selection process can be better understood in the flowchart presented in Figure 1 below.

The selected papers were all fully read and some information, such as the title of the study, year of publishing, thematic and considerations were included in a table (Table 1).

After analyzing all selected studies, it was found that going through a period of pandemic has increases in substances uses so as to alleviate negative feelings (Volkow, 2020). This topic causes concerns, especially because it was found that seven of the analyzed papers mentioned difficulties and concerns regarding to health care systems. This happens especially for those who are vulnerable to addictions, whereas there has been an increase in demands related to COVID-19 and, consequently, people with substance use disorder and opioid users have been suffering from not having enough support, increasing chances of relapses and overdoses (Alexander, Stoller, Haffajee, & Saloner 2020; Arya & Gupta, 2020; Becker & Fiellin, 2020; Girolamo et al., 2020; Kar et al., 2020; Lima et al., 2020; Volkow, 2020). Opioid dependent users who are treated daily with a special dispenser can not miss a dose, and when faced locked down, chances of relapse increase (Kar, et al., 2020). The homeless is also a very susceptible group once bad housing quality is associated with health issues, increasing chances of virus diseases, addiction to substances, in special alcohol consumption, and other comorbidities (Lima et al. 2020).

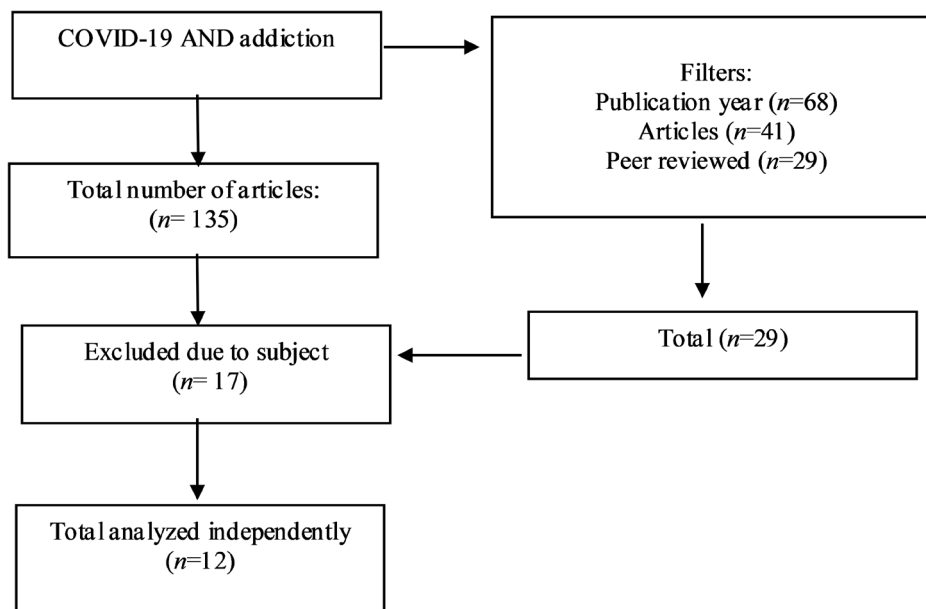


Figure 1. Flowchart of the Selection Process to Eligible Articles, Including CAPES Periodicals.

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Table 1. Articles Surveyed at CAPES Periodicals on Integrative Review (N= 12)

Title, Year, Journal	Authors	Aims	Considerations and Main Results
People experiencing homelessness: Their potential exposure to COVID-19 (2020). <i>Psychiatry Research</i> .	<i>Lima, N. N. R. et al.</i>	Identify, using large-sized newspapers, studies that are associated to homelessness and COVID-19.	People who live in shelters or on the street are vulnerable, suffer from addiction and are more prone to get illnesses and viruses.
Collision of the COVID-19 and Addiction Epidemics (2020). <i>Annals of Internal Medicine</i> .	Volkow, N. D.	Review critically studies about substance users and health support access in pandemic.	Coronavirus disease is causing challenges to health care, especially for those addicted to substances.
Problematic Online gaming and the COVID-19 pandemic (2020). <i>Journal of behavioral addictions</i> .	King, D. L., Delfabbro, P. H., Billieux, J. & Potenza, M. N.	Critical review to identify pandemic outbreaks and the relation to increases in online gaming.	Games may be coping strategies to COVID-19, but there was an increase in excessive gaming intensifying disorders.
COVID-19 pandemic and addiction: Current problems and future concerns (2020). <i>Asian Journal of Psychiatry</i> .	Kar, S. K. et al.	Info article to review critically the incidence of addictive behaviors and pandemic time.	There is an urgent need to address mental health issues during pandemic because of its impact in addictive behaviors. There are reductions in use, but also experiences in withdrawal symptoms, especially in adolescents.
Functional Fear Predicts Public Health Compliance in the COVID-19 Pandemic (2020). <i>International Journal of Mental Health and Addiction</i> .	Harper, C. A., Satchell, L. P., Fido, D. & Latzman, R. D.	Examine individual differences in emotionally and personality-based variables in predicting virus-mitigating behaviors.	A sample of (N=324) adults responded online scales to access fear of the virus, behavioral changes in response to the pandemic and other variables.
COVID-19 outbreak: Challenges for Addiction services in India (2020). <i>Asian Journal of Psychiatry</i> .	Arya, S. & Gupta, R.	Identify challenges in addictions services in India due to the pandemic period.	Assessing treatment services have become more difficult especially for patients with substance use disorders.
Mental Health in the Coronavirus Disease 2019 Emergency- The Italian Response (2020). <i>JAMA Psychiatry</i> .	<i>Girolamo, G. et al.</i>	Briefly report the experience of mental health services during coronavirus disease crisis.	Health services had been reorganized to admit patients with COVID-19 and consequently addiction services are also affected increasing risks of overdoses.
When Epidemics Collide: Coronavirus Disease 2019 (COVID-19) and the Opioid Crisis (2020). <i>Annals of Internal Medicine</i> .	Becker, W. C & Fiellin, D. A.	Identify the relation between COVID-19 and opioid use in the USA.	The crisis will increase catastrophic opioid overdose rates in special for those with opioid use disorder.
An Epidemic in the Midst of Pandemic: Opioid Use Disorder and COVID-19 (2020). <i>Annals of Internal Medicine</i> .	Alexander, C. G. et al.	Explore challenges in the USA health care system for those who are already in treatment for addictions.	Opioid treatment programs and other substance use disorder treatment systems must be integrated with other services to provide help.
A Marketing Approach to a Psychological Problem: Problematic Smartphone Use on Adolescents (2020). <i>International Journal of Environmental Research & Public Health</i> .	Ertemel, A. V. & Ari, E.	Test an approach which integrates consumer behavior theories and techniques in N=305 students with mean age 14.57.	During pandemic times living without technologies has become almost impossible and it is necessary an integrative approach to help adolescents with self-regulatory addictions. The study showed smartphone addiction levels decreased after the educative program.
Contextualising the 2019 E-Cigarette Health Scare: Insights from Twitter (2020). <i>International Journal of Environmental Research & Public Health</i> .	Ahmed, W., Marin-Gomez, X. & Vidal-Alaball, J.	Identify on Twitter discussions about E-cigarette and understand which public was de most interested in this subject.	E-cigarette use could be identified as a health scare on Twitter, similar to COVID-19, due to its negative effect on health. E-cigarettes foster nicotine addiction.
Systematic review of the prevalence of current smoking among hospitalized COVID-19 patients in China: could nicotine be a therapeutic option? (2020). <i>Internal and Emergency Medicine</i> .	Farsalinos, K., Barbouni, A. & Niaura, R.	Systematic review of literature (PubMed) was performed to examine the prevalence of current smoking among hospitalized patients with COVID-19 in China. Thirteen studies were analyzed as meta-analysis.	Smoking does not appear to be a predisposing factor for hospitalization for COVID-19, although smokers are more likely to suffer from comorbidities that may be implicated in COVID-19 mortality.

Regarding alcohol consumption, stand out a study developed with a sample of 2871 adults which aimed to focus and analyze individual characteristics, contextual factors and mental health variables on alcohol consumption during COVID pandemics, it was found that the reasons why there was an increasing in consumption were to chill out, relax, boredom, worries about pandemic, tensions with partners and having more free time (Schmits & Glowacz, 2021).

Nicotine dependence and its relation with respiratory diseases was also mentioned in two papers (Ahmed, Marin-Gomes, & Vidal-Alaball, 2020; Farsalinos, Barbouni, & Niaura, 2020). In one of them, performed in China, a literature search was conducted aiming to identify the prevalence of current smoking among hospitalized patients with COVID-19. The result showed that nicotine users are more prone than non-smokers to suffer from comorbidities (Farsalinos et al., 2020).

In other study nicotine usage through E-cigarette was mentioned after a search on Twitter. It was found that the platform is useful with regard to the dissemination of information related to cigarette use, especially in times of pandemic (Ahmed et al., 2020). In a research developed to investigate the search for services related to mental health during the pandemic, it was detected that individuals with cannabis misuse were more likely to have emergency presentation during lockdown, suggesting that the use has raised considerably (Capuzzi et al., 2020).

Apart from substance addiction, behavioral addictions were also found in the studies (Ertemel & Ari, 2020; Kar et al., 2020; King et al., 2020). One of them describes the increasing in gaming and its consequences to mental health, physical health and sleeping patterns (King, et al., 2020). In the same study, some positive aspects of gaming are mentioned, especially during a pandemic time, once they might be good strategies to handle stress and aversive emotions, such as anxiety, thus, it is mentioned that controlling usage time is essential (King et al., 2020; WHO; 2020b). Other behaviors that may have increased during quarantine and might develop an addiction, are long exposures to television and electronic gadgets (Kar et al., 2020) which includes smartphone use (Ertemel & Ari, 2020). According to one of the studies, developed with a sample of 305 adolescents, technologies usage increased during COVID-19 as well as, compulsive use of the smartphone (Ertemel & Ari, 2020).

Going through a pandemic period causes increases in psychological distress, such as fear and anxiety, since people have been faced with social isolation, financial difficulties and other consequences that may boost the occurrence of substance use and other behavioral addictions, such as gaming and other technology overusing (Harper, Satchell, Fido, & Latzman, 2020; Kar et al., 2020; Rehm, et al., 2020). Anxiety levels may also be affected by information overload due to the difficulty to classify which is true or false, after seen a huge amount of contradictory information (Girolamo et al., 2020). It is known that technology is essential, once most knowledge about the pandemics comes from it, but ones should be able to recognize the benefits as well as the dangers caused by exaggerate using (Wiederhold, 2020).

As we are still experiencing a pandemic period, the damage to mental health is likely to increase. Several studies have been developed worldwide, showing the consequences of the pandemic in mental health. In a study that aimed assess the perceived stress related to COVID-19 pandemic and lockdown in students, it was found that more than 79% of the sample, indicated having difficulties managing stress, and under these stressful conditions, women may be able to respond to stress better via increase in food intake while men with increased alcohol consumption (Flaudias et al., 2021).

In another study developed to verify the factors associated with indicators of mental health disorders symptoms during the pandemic, it was found that exposure to frequent news related to deaths and infected cases are more prone to having mental suffering, as well as financial insecurity and violence that might lead to post traumatic disorders. (Duarte, Santo, Lima, Giordani, & Trentini 2020) These data represent, therefore, concerns regarding the context of the pandemic and its consequences, which go beyond the disease itself, but also interfere in people's mental health, causing suffering and leading to an increase in compulsive behaviors, whether related to licit substances, illicit and even technologies.

In such way, it is known that if there is an increase in addictive patterns, needs of mental health support is also going to enhance and some difficulties may appear due to uses of health facilities for cases of COVID-19 in different age groups (Girolamo et al., 2020; Volkow, 2020). In order to prevent these harmful behaviors, it is important to adapt one's lifestyle, executing some health related actions such as engaging in physical

activities, being conscious of self-monitoring and regulating screen time, using relaxation and stress-reduction techniques and seeking for further help if necessary (Király et al., 2020).

Finally, despite relevant findings, our study has some limitations. Once the research was conducted in May 2020, a few empirical studies were found. The available papers presented several bibliographic information and methods such as reviews that helped to predict what would happen to our health system. Currently there are more articles containing empirical data, but, we are still facing the pandemic, so, most available studies collected online data. Another limitation was that studies related to the pandemic have been published in a few countries.

Conclusion

Crisis and pandemic situations require attention due to their potential to the development of technology-related and substance use disorders. The aim of this review was to identify studies that were published related to substance abuse and technology overusing. Most of the studies concerns are related to health care systems, once they are focused on COVID-19 support. Some studies focused on technology overusing, such as gaming and smartphone using, and other focused on substance addiction, such as nicotine, alcohol and opioid.

It is understood that most patients might have relapses and other people may develop addictive behaviors due to the necessity of wellbeing during this period, hyperactivating brain's reward system. It is important for people to execute healthy habits, such as controlling screen use, practicing physical activities and other stress-reducing techniques so as to acquire lower levels of anxiety and negative feelings. Seeking for help is also important and psychological services may be helpful.

In sum, despite some limitations, the current study shows that the pandemic reflects higher demand in hospitals and health centers. The situation involves not only the virus infection, but also, an incidence in stress, anxiety, frustration, depressive symptoms and other mental health issues which may lead to addictive behaviors. Mental health professionals, such as psychologists and psychiatrists are fundamental since they can help in the process of avoiding and controlling stress, anxiety and depressive symptoms, reducing the search for addictive behaviors.

References

- Ahmed, W., Marin-Gomes, X., & Vidal-Alaball, J. (2020). Contextualising the 2019 E-Cigarette Health Score: Insights from Twitter. *International Journal of Environmental Research & Public Health*, *17*(7), 2236. doi: 10.3390/ijerph17072236
- Alexander, G. C., Stoller, K. B., Haffajee, R. L., & Saloner, B. (2020). An epidemic in the midst of a pandemic: Opioid use disorder and COVID-19. *Annals of Internal Medicine*, *173*(1), 59-60. doi: 10.7326/M20-1210
- American Psychiatry Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders – DSM-5*. Washington: Author.
- Arya, S., & Gupta, R. (2020). COVID-19 outbreak: Challenges for addiction services in India. *Asian Journal of Psychiatry*, *51*. doi: 10.1016/j.ajp.2020.102086
- Becker, W. C., & Fiellin, D. A. (2020). When epidemics collide: Coronavirus disease 2019 (COVID-19) and the opioid crisis. *Annals of Internal Medicine*, *173*(1), 59-60. doi: 10.7326/M20-1210
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, *287*. doi: 10.1016/j.psychres.2020.112934
- Capuzzi, E., Brita, C. D., Caldiroli, A., Colmegna, F., Nava, R., Buoli, M., & Clerici, M. (2020). Psychiatric emergency care during Coronavirus 2019 (COVID 19) pandemic lockdown: Results from a Department of Mental Health and Addiction of northern Italy. *Psychiatry Research*, *293*. doi: 10.1016/j.psychres.2020.113463
- Cerniglia, L., Zoratto, F., Cimino, S., Laviola, G., Ammaniti, M., & Adriani, W. (2017). Internet Addiction in adolescence: Neurobiological, psychological and clinical issues. *Neuroscience and Biobehavioral Reviews*, *76*, 174-184. doi: 10.1016/j.neubiorev.2016.12.024
- Choi, B. Y., Huh, S., Kim, D. J., Suh, S. W., Lee, S. K., & Potenza, M. N. (2019). Transitions in problematic internet use: A one-year longitudinal study of boys. *Psychiatry Investigation*, *16*(6), 433-442. doi: 10.30773/pi.2019.04.02.1
- Dignum, F., Dignum, V., Davidsson, P., Ghorbani, A., Van Der Hurk, M., Jensen, M., ... Verhagen, H. (2020). Analysing the combined health, social and economic impacts of the coronavirus pandemic using agent-based social stimulation. *Minds & Machines*, *30*(2), 177-194. doi: 10.1007/s11023-020-09527-6
- Duarte, M. Q., Santo, M. A. S., Lima, C. P., Giordani, J. P., & Trentini, C. M. (2020). Covid-19 and the impacts on mental health: A sample from Rio Grande do Sul, Brazil. *Ciência e Saúde Coletiva*, *25*(9), 3401-3411. doi: 10.1590/1413-81232020259.16472020
- Ertemel, A. V., & Ari, E. (2020). A Marketing approach to a psychological problem: Problematic smartphone use on adolescents. *International Journal of Environmental Research & Public Health*, *17*(7). doi: 10.3390/ijerph17072471
- Farsalinos, K., Barbouni, A., & Niaura, R. (2020). Systematic review of the prevalence of current smoking among hospitalized COVID-19 patients in China: Could nicotine be a therapeutic option. *Internal and Emergency Medicine*, *15*(5), 845-852. doi: 10.1007/s11739-020-02355-7

- Flaudias, V., Zerhouni, O., Pereira, B., Cherpitel, C. J., Boudesseul, J., Chazeron, I., ... Brousse, G. (2021). The early impact of the COVID -19 lockdown on stress and addictive behaviors in an alcohol-consuming student population in France. *Frontiers in Psychiatry, 12*, 73. doi: 10.3389/fpsy.2021.628631
- Fumero, A., Marrero, R. J., Voltes, D., & Peñate, W. (2018). Personal and social factors involved in internet addiction among adolescents: A meta-analysis. *Computer in Human Behavior, 86*, 387-400. doi: 10.1016/j.chb.2018.05.005
- Gholamian, B., Shahnazi, H., & Hassanzadeh, A. (2017). The prevalence of internet addiction and its association with depression, anxiety, and stress, among high-school students. *International Journal of Pediatrics, 5*(4), 4763- 4770. doi: 10.22038/ijp.2017.22516.1883
- Girolamo, G., Cerveri, G., Clerici, M., Monzani, E., Psinogatti, F., Starace, F., ... Vita, A. (2020). Mental health in the Coronavirus disease 2019 emergency – The Italian response. *JAMA Psychiatry, 77*(9), 974-976. doi: 10.1001/jamapsychiatry.2020.1276
- Harper, C. A., Satchell, L. P., Fido, D., & Latzman, R. D. (2020). Functional fear predicts public health compliance in the COVID-19 Pandemic. *International Journal of Mental Health and Addiction*, 1-14. Advance online publication. doi: 10.1007/s11469-020-00281-5
- Hui, D. S., Azhar, E. I., Madani, T. A., Ntoumi, F., Kock, R., Dar, O., ... Petersen, E. (2020). The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health—the latest 2019 novel coronavirus outbreak in Wuhan, China. *International Journal of Infectious Diseases, 91*, 264-266. doi: 10.1016/j.ijid.2020.01.009
- Kar, S. K., Arafat, S. M. Y., Sharma, P., Dixit, A., Marthoenis, M., & Kabir, R. (2020). COVID-19 pandemic and addiction: Current problems and future concerns. *Asian Journal of Psychiatry, 51*, 102064. doi: 10.1016/j.ajp.2020.102064
- King, D. L., Delfabbro, P. H., Billieux, J., & Potenza, M. N. (2020). Problematic online gaming and the COVID-19 pandemic. *Journal of Behavioral Addictions, 9*(2), 184-186. doi: 10.1556/2006.2020.00016
- Király, O., Potenza, M. N., Stein, D. J., King, D. L., Hodgins, D. C., Saunders, J. B., ... Demetrovics, Z. (2020). Preventing problematic internet use during the COVID-19 pandemic: Consensus guidance. *Comprehensive Psychiatry, 100*, 152180. doi: 10.1016/j.comppsy.2020.152180
- Koehler, S., Ovadia-Caro, S., Meer, E. V. D., Villringer, A., Heinz, A., Romanczuk-Seiferth, N., & Margulies, D. S. (2013). Increased functional connectivity between Prefrontal Cortex and Reward System in pathological gambling. *Plos one, 8*(12), e0134179. doi: 10.1371/journal.pone.0084565
- Lima, N. N. R., Souza, R. I., Feitosa, P. W. G., Moreira, J. L. S., Silva, C. G. L., & Neto, M. L. R. (2020). People experiencing homelessness: Their potential exposure to COVID-19. *Psychiatry Research, 288*, 112945. doi: 10.1016/j.psychres.2020.112945
- Nahas, M., Hlais, S., Saberian, C., & Antoun, J. (2018). Problematic smartphone use among Lebanese adults aged 18-65 years using MPPUS-10. *Computers in Human Behavior, 87*, 348-353. doi: 10.1016/j.chb.2018.06.009
- Perales, J. C., King, D. L., Navas, J. F., Schimmenti, A., Sescousee, G., Starcevic, V., ... Billieux, J. (2020). Learning to lose control: A process-based account of behavioral addiction. *Neuroscience & Biobehavioral Reviews, 108*, 771-780. doi: 10.1016/j.neubiorev.2019.12.025
- Petry, N. M., Zajac, K., & Ginley, M. K. (2018). Behavioral addictions as mental disorders: To be or not to be?. *Annual Review of Clinical Psychology, 14*, 339-423. doi: 1146/annurev-clinpsy-032816-045120
- Prajapat, M., Sarma, P., Shekhar, N., Avti, P., Sinha, S., Kaur, H., ... Medhi, B. (2020). Drugs targets for corona virus: A systematic review. *Indian Journal of Pharmacology, 52*(1), 56-65. doi: 10.4103/ijp.IJP_115_20
- Rehm, J., Kilian, C., Ferreira-Borges, C., Jernigan, D., Monteiro, M., Parry, C. D. H., ... Manthey, J. (2020). Alcohol use in times of the COVID 19: Implications for monitoring and policy. *Drug and Alcohol Review, 39*(4), 301-304. doi: 10.1111/dar.13074
- Saadat, S., Rawtani, D., & Hussain, C. M. (2020). Environmental perspective of COVID-19. *Science of the Total Environment, 728*, 138870. doi: 10.1016/j.scitotenv.2020.138870
- Sargent-Cox, K., Butterworth, P., & Anstey, K. (2011). The global financial crisis and psychological health in a sample of Australian older adults: A longitudinal study. *Social Science & Medicine, 73*, 1105-1112. doi:10.1016/j.socscimed.2011.06.063
- Schmits, E., & Glowacz, F. (2021). Changes in alcohol use during the COVID-19 Pandemic: Impact of the lockdown conditions and mental health factors. *International Journal of Mental Health and Addiction*. doi: 10.1007/s11469-020-00432-8
- Souza, M. T., Silva, M. D., & Carvalho, R. (2010). Revisão integrativa: o que é e como fazer. *Einstein, 8*(1), 102-106. doi: 10.1590/s1679-45082010rw1134
- Stenason, L., & Vernon, P. A. (2016). The Dark Triad, reinforcement sensitivity and substance use. *Personality and Individual Differences, 94*, 59-63. doi: 10.1016/j.paid.2016.01.010
- Valkov, P. (2018). School dropout and substance use: Consequence or predictor? *Trakia Journal of Sciences, 16*(2), 95-101. doi: 10.15547/tjs.2018.02.004
- Volkow, N. D. (2020). Collision of the COVID-19 and Addiction Epidemics. *Annals of Internal Medicine, 173*(1), 61-62. doi: 10.7326/M20-1212
- Weinstein, A., Yaacov, Y., Manning, M., Danon, P., & Weizman, A. (2015). Internet addiction and attention deficit hyperactivity disorder among schoolchildren. *Israel Medical Association Journal, 17*(12), 731- 734. Retrieved from <https://www.ima.org.il/FilesUploadPublic/IMAJ/0/181/90631.pdf>
- Whittemore, R., & Kafk, K. (2005). The integrative review: updated methodology. *Journal of Advanced Nursing, 52*(2), 546-553. doi: 10.1111/j.1365-2648.2005.03621.x
- Wiederhold, B. K. (2020). Social media use during social distancing. *Cyberpsychology, Behavior, and Social Networking, 23*(5), 275-276. doi: 10.1089/cyber.2020.29181.bkw
- Wilson, M., Gogulski, H. Y., Cuttler, C., Bigand, T. L., Oluwoye, O., Barbosa-Leiker, C., & Roberts, M. A. (2018). Cannabis use moderates the relationship between pain and negative affect in adults with opioid use disorder. *Addictive Behaviors, 77*, 225-231. doi: 10.1016/j.addbeh.2017.10.012

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- Wood, A. P., Dawe, S., & Gullo, M. J. (2013). The role of personality, family influences, and prosocial risk-taking behavior on substance use in early adolescence. *Journal of Adolescence*, *36*, 871-881. doi: 10.1016/j.adolescence.2013.07.003
- World Health Organization. (2020a). *Coronavirus disease (COVID-19) outbreak situation*. Retrieved from https://www.who.int/health-topics/coronavirus#tab=tab_1
- World Health Organization. (2020b). *Looking after our mental health*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response>
- Zilberman, N., Yadid, G., Efrati, Y., & Rassovsky, Y. (2019). Negative and positive life events and their relation to substance and behavioral addictions. *Drug and Alcohol Dependence*, *204*, 107562. doi: 10.1016/j.drugalcdep.2019.107562

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