Journal of Science and Education (JSE)
Vol. 1, No. 2, 2021, 41-47

DOI: 10.56003/jse.v1i2.20
ISSN: 2745-5351

Smartphone sleep technology: health apps during covid-19 to mitigate psychosocial stress among children and adolescents

Cathy Mae Dabi Toquero
College of Education, Mindanao State University-General Santos City, Philippines
E-mail: cathymaetoquero@gmail.com

Received: 13 December 2020 Accepted: 24 January 2021 Published: 1 March 2021

Abstract: Children and adolescents are prone to physical fatigue and psychosocial anxiety because of the ongoing social distancing and sleep deprivations due to the long exposure to digital technology usage during the covid-19 pandemic. This scenario of sleep deprivation affects their educational endeavors and health quality. Through the use of smartphones as a sleep technology approach in mental health, this article reviews relevant literature concerning the mobile health applications for sleep hygiene among children and adolescents. It provides insight into smartphone sleep technology utilization that can alleviate the psychosocial stress and mental health issues that children and adolescents can experience amid the pandemic. The author stressed that the collaboration among health practitioners, educators, and researchers are also pertinent to strengthen health measures and to conduct evidence-based research on digital health interventions. The scientific results can increase smartphone-based sleep applications' monitoring as health interventions for children and adolescents to practice sleep hygiene. Future investigation should also examine and assess the effectiveness of smartphone sleep technologies for sleep quality and mental health outcomes.

Keywords: covid-19; psychosocial stress; mental health; mobile health technology.

Abstrak: Anak-anak dan remaja rentan terhadap kelelahan fisik dan kecemasan psikososial karena penerapan jaga jarak *(social distancing)* dan kurang tidur akibat paparan yang lama dari penggunaan teknologi digital selama pandemi covid-19. Skenario kurang tidur ini memengaruhi upaya pendidikan dan kualitas kesehatan mereka. Melalui penggunaan *smartphone* sebagai pendekatan teknologi tidur dalam kesehatan mental, artikel ini mengulas literatur yang relevan mengenai aplikasi kesehatan seluler untuk kualitas tidur di kalangan anak-anak dan remaja. Ini memberikan wawasan tentang pemanfaatan teknologi tidur pada *smartphone* yang mungkin dapat mengurangi kecemasan psikososial dan masalah kesehatan mental yang dapat dialami anak-anak dan remaja di tengah pandemi. Penulis menekankan bahwa kolaborasi antara praktisi kesehatan, pendidik, dan peneliti juga terkait untuk memperkuat langkah-langkah kesehatan dan melakukan penelitian berbasis bukti tentang intervensi kesehatan digital. Hasil ilmiah dapat meningkatkan pemantauan aplikasi tidur berbasis *smartphone* sebagai intervensi kesehatan bagi anak dan remaja untuk mempraktikkan kualitas tidur *(sleep hygiene)*. Penyelidikan di masa depan juga harus memeriksa dan menilai efektivitas penggunaan teknologi tidur pada *smartphone* untuk kualitas tidur dan hasil kesehatan mental.

Kata kunci: covid-19; kecemasan psikososial; kesehatan mental; teknologi kesehatan seluler.

How to cite: Toquero, C. M. D. (2021). Smartphone sleep technology: health apps during covid-19 to mitigate psychosocial stress among children and adolescents. *Journal of Science and Education (JSE), 1(2): 41-47.* https://doi.org/10.56003/jse.v1i2.20

INTRODUCTION

Many young children worldwide have been affected by the sudden changes in the school and home settings due to COVID-19. Due to social distancing measures, numerous children are diverting into emerging technologies such as social media to turn their home quarantine experience to something enjoyable using technologies. However, children and adolescents tend to experience sleep problems due to the changes in their lifestyles and schooling routines during the pandemic.

As children and young adults face the reality of experiencing stress and worries due to the crisis, they are also deprived of decent sleep and proper cardiorespiratory exercises as they spend countless hours playing online digital games and chatting with their friends in social network. Consequently, the relentless distressing situation due to COVID-19 and the long exposure to radiation using smartphones can be detrimental to their social, emotional, physical, and psychological well-being that can lead to anxiety and depression in the long term. Aside from these scenarios, sleep deprivations can mean barriers and challenges as children also experienced transitioning to emergency remote education (Talidong, 2020; Toquero, 2020a; Toquero, 2020b) during this pandemic that can also affect their learning behaviors. Considering their sleep problems, the use of smartphones can assess and monitor sleep patterns but there is little research on its application as an approach to depressive, anxiety, and psychotic disorders and few studies provided report on the use of smartphones for sleep problems and mental health outcomes (Aledavood, et al., 2019; Jandoo, 2020; Villanueva et al., 2017). Thus, the author examines the impact of COVID-19 to the sleeping behaviors of children and adolescents, discusses the potentials of the usage of sleep technology to mitigate sleep problems, and highlights collaboration among health practitioners to help children and their families during this emergency.

METHOD

This article discusses the current literature on how COVID-19 results to sleep problems and psychosocial stress to the children and adolescents that created for their health issues. The article utilized the traditional narrative review method (Bozkurt, 2019) to analyze how mobile health applications or smartphones may offer solutions to the sleep disturbances among children and adolescents. This method can provide a much need bridge between the vast and scattered assortment of articles on a topic and to link together many studies on different topics, either for purposes of reinterpretation or interconnection (Baumeister & Leary, 1997). Moreover, this way of presenting the article proves advantageous as the analysis depends on current knowledge to synthesize literature, draw conclusions, identify research gaps, and suggests for future studies (Cronin, Ryan, & Coughlan, 2008).

1. Smartphone technology and health problems due to covid-19

Some children and young adults may have some form of compromised health issues so they should be given protection amid COVID-19. The rise of smartphone utilization in a technologically-advanced world, and more than ever, the need for social relationships to be done online in social networks due to COVID-19 (Toquero & Talidong, 2020) intensify increased health risks among children and adolescents.

Studies have pointed out that using mobile phones can cause health problems and sleep disturbances. Schweizer et. al. (2016) asserted that smartphones tend to cause sleep disturbance among adolescents. Valasareddy et al., (2019) also studied and confirmed that prolonged smartphone usage brings adverse effects to sleep patterns and detriment sleep health. Similarly, survey results also showed associations of technology use (such as cellphones, computers, video games, and television) and sleep difficulty among

children and adolescents (Fuller et al., 2017). A study also pointed out the negative effects of smart mobile devices on sleep quality in relation to academic performance (Owusu-Marfo et al., 2018).

Aside from the health risks due to addiction to smartphones (Valasareddy, et al., 2019), and risks associated with long exposure to digital devices, the fear of the unknown (Arafat, Kar, & Kabir, 2020) such as the novel coronavirus and continuous social isolation can accelerate anxiety and mental health problems (Armitage & Nellums, 2020; Poletti & Raballo, 2020a; Poletti & Raballo, 2020b; Van Lancker & Parolin, 2020) in children along with self-isolation and sleep deprivation. The findings of a study suggested that insomnia is associated and highly prevalent with COVID-19 psychological reactions and irregular sleep hygiene (Li, Qin, Sun, Sanford, Vgontzas & Tang, 2020) among individuals and children and adolescents are no exemption. Thus, Köse, Yılmaz, Ocakoğlu & Özbaran (2017) suggested that behavioral and educational interventions can help improve sleep hygiene among children.

2. Opportunities of sleep technology

Köse et al. (2017) stressed of behavioral and educational interventions, and reality is that, there are two sides to technology, it can offer advantages and disadvantages. Based on the aforementioned reviewed literature and studies, smartphone technology can cause addiction and sleep disturbances among children and adolescents. On the other hand, the use of smartphone technologies also offers opportunities for scientific investigation, such as using smartphone applications to monitor sleep hygiene among children and adolescents.

Choi et al (2018) conducted a systematic review and concluded that smartphone applications have the potential for sleep self-management. They concluded, "consumer-targeting apps that support sleep self-management have the potential to help raise awareness and promote healthy sleep habits. However, without regulation and enforcement of clinical validation compliance, these apps should certainly be used with caution (pp. 1789)."

As one study argued, sleep technologies can exhibit potential insight concerning long-term sleep patterns including circadian rhythm disturbances (Khosla & Wickwire, 2020) that people may experience due to the pandemic. In that case, the use of sleep tracking devices can increase sleep awareness among children and adolescents to program the brain to follow sleep routines and thereby achieve sleep quality. Although there are very little studies done to document smartphone-based sleep technology on mental health outcomes (Aledavood et al, 2019), there are greater research opportunities to test the effectiveness of smartphone sleep technologies to mitigate anxiety and sleep problems, especially among children and young adults.

Overall, the impact of digital applications in the healthcare has not been assessed so a need arises to provide evidence-based insights in providing solutions of the effectiveness of digital applications (Jandoo, 2020). Villanueva et al. (2017) also argued the lack of evidence that has rigorously assessed the impact of mobile health and telemedicine.

DISCUSSION

During this pandemic, some prevailing questions remain such as how to use the advanced technologies to give the children and adolescents the right protection including regular sleep? How can health experts, educators on school health, and researchers give better and timely health communication (Zhang, Gui, Xu, Zhu, Zhai, Ge & Xu, 2020) to alleviate the effects of COVID-19 on the psycho-social and physical health of children and adolescents?

To mitigate the sleep deprivation and psychosocial stress among children and adolescents, the utilization of smartphone sleep applications may be useful to keep track of their sleeping patterns and put off the use of their phones in scheduled time arrangements. Children and young adults can train and exercise their brain to sleep at a regular circadian rhythm and thereby avoid sleeping quandaries due to the perplexing situations that can be experienced during this COVID-19 period. The children need adult supervision to monitor the progress of their sleeping patterns since this may also affect their psychosocial health. Since some children have bedtime resistance, the solution is also on behavioral changes, so there are opportunities in the use of sleep technology as behavioral intervention. However, the use of sleep apps available in the market need health certificate compliance (Choi et al., 2018), so caution should be in mind when using smartphone sleep apps.

Health experts, educators on school health, and health researchers can provide better and timely health communication to the stakeholders and guardians of children by strengthening collaboration and exchange of best practices on health interventions. They can share data, knowledge, and scientific information to update the stakeholders with evidence-based sleep hygiene and health hygiene practices. Their efforts will help the children and adolescents to manage the impacts of COVID-19 to their mental and physical well-being.

The health practitioners and health researchers can make use of sleep technology paired with online mental health counseling (Liu et al, 2020) and teleconferencing to give guidance to parents and stakeholders to mitigate the psychosocial stress of the children. Recent studies also found that healthcare workers, health practitioners, and health services belong to the most trusted sources (Khosravi, 2020; Siegrist & Zingg, 2014; van der Weerd, Timmermans, Beaujean, Oudhoff, & van Steenbergen, 2011) in information dissemination. Thus, health experts should serve to communicate relevant health information, model a recommended and hygienic behavior, and create a transparent information strategy (Siegrist & Zingg, 2014).

CONCLUSION

Studies examined and concluded that smartphone technologies can engender poor sleep quality and other negative behaviors due to sleep deprivation that affect the overall health performance among children and adolescents. While many authors have unity in the negative effects of smartphones to sleep quality, recent body of literature points out the insufficient evidence on the impact of smartphone technology to health outcomes (sleep hygiene and mental health) of children and adolescents during COVID-19 period.

Based on the narrative review of existing and current literature, the cross-examination offers the following conclusions:

a. Existing studies have shown the detrimental effects of smartphone applications to sleep quality. However, the use of smartphone sleep applications may present scientific opportunities to offer children with a form of psychosocial and physical support to lessen the psychosocial stress, sleep deprivations, and emotional toils that children can experience due to the heightening global health emergency.
b. The collaboration and communication among practitioners can serve as model for the stakeholders to exhibit hygiene practices. However, health researchers, medical practitioners, and health educators need to conduct assessments to evaluate the effectiveness of digital applications as health interventions during this time when children tend to be most vulnerable.
c. There is insufficient evidence-based assessments done on the effectiveness of smartphone sleep apps as interventions for health practices (sleep tracking devices for sleep hygiene and better psychosocial outcomes).
d. Likewise, there is a need for digital health interventions that is grounded on scientific evidence to help children deal with the anxiety that they are experiencing during this pandemic. The effectiveness of sleep technology for the children and adolescents should also be assessed by health researchers and experts.

FUTURE DIRECTIONS

Future research should be done on the use of sleeping technology for the capability for behavior change during COVID-19 (Mbae, 2020) among children and young adults. Researchers can delve with how these sleeping technologies along with mental health counseling and mental health teleconferencing can help children and adolescents deal with insomnia problems and psychosocial stress (Xiang et al, 2020) amid a health emergency. There are several key priorities for health services and health practitioners to evaluate the role of digital technologies for prospective challenges and promising opportunities (Bhugra et al, 2017), and the use of smartphone or mobile apps for health outcomes is still a prevailing scientific investigation to date.

REFERENCES

Aledavood, T, Torous J, Hoyos, AMT, Naslund, J., Onnela, J., Keshavan,M. (2019). Smartphone-Based Tracking of Sleep in Depression, Anxiety, and Psychotic Disorders. *Current Psychiatry Reports*, 21:49 https://doi.org/10.1007/s11920-019-1043-y

Arafat, S. Y., Kar, S. K., & Kabir, R. (2020). Possible controlling measures of panic buying during COVID-19. *International Journal of Mental Health and Addiction*, 1-3. https://doi.org/10.1007/s11469-020-00320-1

Armitage, R., & Nellums, L. B. (2020). Considering inequalities in the school closure response to COVID-19. *The Lancet Global Health*, *8*(5), e644. https://doi.org/10.1016/S2214-109X(20)30116-9

Baumeister, R. F., & Leary, M. R. (1997). Writing narrative literature reviews. *Review of General Psychology*, 1(3), 311–320. https://doi.org/10.1037/1089-2680.1.3.311

Bhugra, D., Tasman, A., Pathare, S., Priebe, S., Smith, S., Torous, J., & Ventriglio, A. (2017). The WPA-lancet psychiatry commission on the future of psychiatry. *The Lancet Psychiatry*, *4*(10), 775-818.

Bozkurt, A. (2019). From distance education to open and distance learning: A holistic evaluation of history, definitions, and theories. In *Handbook of Research on Learning in the Age of Transhumanism* (pp. 252-273). IGI Global.

Choi, Y. K., Demiris, G., Lin, S. Y., Iribarren, S. J., Landis, C. A., Thompson, H. J., ... & Ward, T. M. (2018). Smartphone applications to support sleep self-management: review and evaluation. *Journal of Clinical Sleep Medicine*, *14*(10), 1783-1790. https://doi.org/10.5664/jcsm.7396

Cronin, P., Ryan, F., & Coughlan, M. (2008). Undertaking a literature review: a step-by-step approach. *British journal of nursing*, *17*(1), 38-43. https://doi.org/10.12968/bjon.2008.17.1.28059

Fuller, C., Lehman, E., Hicks, S., & Novick, M. B. (2017). Bedtime use of technology and associated sleep problems in children. *Global pediatric health*. https://doi.org/10.1177/2333794X17736972

Jandoo, T. (2020). WHO guidance for digital health: What it means for researchers. *DIGITAL HEALTH*. http://dx.doi.org/10.1177/2055207619898984

Khosla, S., Wickwire, E. M. (2020). Consumer sleep technology: accuracy and impact on behavior among healthy individuals. *J Clin Sleep Med*. 16(5), 665–666. https://doi.org/10.5664/jcsm.8450

Khosravi, M. (2020). Perceived Risk of COVID-19 Pandemic: The Role of Public Worry and Trust. *Electronic Journal of General Medicine, 17*(4), em203. https://doi.org/10.29333/ejgm/7856

Köse, S., Yılmaz, H., Ocakoğlu, F. T., & Özbaran, N. B. (2017). Sleep problems in children with autism spectrum disorder and intellectual disability without autism spectrum disorder. *Sleep Medicine, 40,* 69-77. https://doi.org/10.1016/j.sleep.2017.09.021

Li, Y., Qin, Q., Sun, Q., Sanford, L. D., Vgontzas, A. N., & Tang, X. (2020). Insomnia and psychological reactions during the COVID-19 outbreak in China. *Journal of Clinical Sleep Medicine*, *16*(8), 1417-1418. https://doi.org/10.5664/jcsm.8524

Liu, S., Yang, L., Zhang, C., Xiang, Y. T., Liu, Z., Hu, S., & Zhang, B. (2020). Online mental health services in China during the COVID-19 outbreak. *The Lancet Psychiatry*, *7*(4), e17-e18. https://doi.org/10.1016/S22150366(20)30077-8

Mbae, N. (2020). COVID-19 in Kenya. *Electronic Journal of General Medicine*, *17*(6), em231. https://doi.org/10.29333/ejgm/7896

Owusu-Marfo, J., Lulin, Z., Antwi, H. A., Kissi, J., Antwi, M. O., & Asare, I. (2018). The Effect of Smart mobile devices usage on Sleep Quality and academic performance–A Narrative Review. *Canadian Journal of Applied Science and Technology*, *6*(2).

Poletti, M., & Raballo, A. (2020). Letter to the editor: Evidence on school closure and children's social contact: useful for coronavirus disease (COVID-19)?. *Eurosurveillance*, *25*(17), 2000758. https://doi.org/10.2807/1560-7917.ES.2020.25.17.2000758

Poletti, M., & Raballo, A. (2020). COVID-19 and effects of school closure for children and their families: a deafening silence. *JAMA Pediatr. Forthcoming.*

Schweizer, A., Berchtold, A., Barrense-Dias, Y., Akre, C., & Suris, J. (2017). Adolescents with a smartphone sleep less than their peers. *European Journal of Pediatrics*, 176(1), 131-136.

Siegrist, M., & Zingg, A. (2014). The role of public trust during pandemics: Implications for crisis communication. *European Psychologist, 19*(1), 23–32. https://doi.org/10.1027/1016-9040/a000169

Talidong, K. J. (2020). Implementation of emergency remote teaching (ERT) among Philippine teachers in Xi'an, China. *Asian Journal of Distance Education*, *15*(1), 196-201. Retrieved from http://asianjde.org/ojs/index.php/AsianJDE/article/view/463

Toquero, C. M. (2020). Emergency remote education experiment amid COVID-19 pandemic. *IJERI: International Journal of Educational Research and Innovation*, (15), 162-172. https://doi.org/10.46661/ijeri.5113

Toquero, C. M. D. (2020b). Inclusion of People with Disabilities amid COVID-19: Laws, Interventions, Recommendations *Multidisciplinary Journal of Educational Research*, *10*(2), 158-177. http://dx.doi.org/10.447/remie.2020.5877

Toquero, C. M. D., & Talidong, K. J. B. (2020). Socio-educational implications of technology use during COVID-19: A case study in General Santos City, Philippines. *Human Behavior and Emerging Technologies*. https://doi.org/10.1002/hbe2.214

Valasareddy, M., Wang, W., Abdul-Al, C. & Niles, S. (2019). The Impact of Bedtime Smartphone Usage on Sleep Health: A Pilot Quantitative Study. *Issues in Information Systems* 20(4), 75-85, https://doi.org/10.48009/4_iis_2019_75-89

van der Weerd, W., Timmermans, D. R., Beaujean, D. J., Oudhoff, J., & van Steenbergen, J. E. (2011). Monitoring the level of government trust, risk perception and intention of the general public to adopt protective measures during the influenza A (H1N1) pandemic in the Netherlands. *BMC public health*, *11*(1), 1-12. https://doi.org/10.1186/1471-2458-11-575

Van Lancker, W., & Parolin, Z. (2020). COVID-19, school closures, and child poverty: a social crisis in the making. *The Lancet Public Health*, *5*(5), e243-e244.

Villanueva, J. A., Suarez, M. C., Garmendia, O., Lugo, V., Ruiz, C., & Montserrat, J. M. (2017). The role of telemedicine and mobile health in the monitoring of sleep-breathing disorders: improving patient outcomes. *Smart Homecare Technology and Telehealth*, *4*, 1-11.

Xiang, Y. T., Yang, Y., Li, W., Zhang, L., Zhang, Q., Cheung, T., & Ng, C. H. (2020). Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry*, *7*(3), 228-229. https://doi.org/10.1016/S2215-0366(20)30046-8

Zhang, X. B., Gui, Y. H., Xu, X., Zhu, D. Q., Zhai, Y. H., Ge, X. L., & Xu, H. (2020). Response to children's physical and mental needs during the COVID-19 outbreak. *World Journal of Pediatrics*, *16*, 278-279. https://doi.org/10.1007/s12519-020-00365-1