Advances in digital technology: Effect on child and adolescent behavior

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Personal greeting and remarks...

I will not be wrong if I would say that these days the problems for which the adolescents are being brought to the psychiatric outpatient departments are changing. We used to see adolescents with complaints such as refusal to go to school, hyperventilation, fighting with siblings, and difficulty in reading/writing. Now, the scenario is fast changing. These days we often come across new type complaints for which adolescents are being brought to our outpatient departments. As an academician and clinician, I find these very challenging and interesting to manage.

The other day an adolescent was referred to me by an orthopedic surgeon for neck pain. The reason was that the teen was spending nearly 12 h in smartphone playing an online game and due to the peculiar posture, he was holding the phone for such long periods he started having pain in the neck. Hence, we are coming across more of complaints such as the post-Millennials/Generation Z is preoccupied with getting a perfect selfie, building castles in virtual reality games, watching porn, exposure to violence, unable to stay without being connected with Internet, online procurement of drugs, throwing temper tantrums to get a smartphone, using short forms while writing notes which used in texting, sleeping late in night texting, and using dark web, etc.

The impact which technology has on mental health is not a new issue. It has been there since long. Only difference it was not a major concern until recently. Previously, it was on topics such as excess television viewing and spending more time talking on phone. The concerns during that time were decreasing school/college grades, change in food habits, decreased socialization, obesity, difficulty in controlling the time spent, etc. Now, the problems have only increased and become more noticeable, which can be attributed directly or indirectly to the advances in the technology. The problem currently is also not static but dynamic, as in increasing and taking a variety of different unimaginable forms. When we are ready with the solution to a particular problem, another problem has already raised. Recently if we can remember there was the problem of Blue Whale game, by the time it was recognized that deaths have taken place. The government has taken appropriate measures and removed it from being made available, but in the same place, new games have started appearing like salt and ice challenge, Kiki challenge, etc.

Speaking of technology, we can broadly divide the technology into traditional and newer ones. In traditional ones, we can include television, desktop computer, feature phones, pagers, console playable games, etc., and in newer ones, we can include smartphones, tablets, laptops, PlayStation, social media, etc., The older technology had its limitations; mainly, it cannot be expandable in terms of usage after a certain degree. The newer technologies have no boundaries in terms of expansion of usage. It can be best understood by a new generation smartphone, which can do many tasks at the same time such as playing videos/songs, reading a book, interacting with a human, booking a ticket, and guiding on a route.

Technology can have an impact on virtually every aspect of mental health. Although technology is not the leading cause of mental health issues, the research suggests that the impact which it has is significant. Despite the evidence for potential harm, there is also evidence for beneficial effects.

Adolescents have helped drive the mass adaptation of modern technologies in the society. They have unprecedented access to new technologies and use them in expected and unexpected ways. A recent research by Pew Internet and American life project revealed that 93% of adolescents aged 12–17 years are online, 71% have access to smartphone, 51% Internet users reported watching videos, 65% reported visiting Facebook, 38% making online shopping, and 28% making health-related browsing. Youth remain the most active users today, relying on WhatsApp and e-mails to develop and maintain the friendship and romantic relationships.

Research on the psychological implications of using and being exposed to social networking websites is an emerging area of interest. WahatsApp and Facebook became the most popular social networking sites; they surpassed Google as the most visited site in 2010. As of 2015, it remains the most used social media site in adolescents aged 13–17 years, followed by Instagram, Snapchat, and Twitter.
Digital technologies have both advantages and disadvantages. The literature is heavily dominated by negative outcomes related to adolescent’s use of technology. The aspects in which it is implicated as negatively affected are addiction, aggression, and decreased empathy. The positive outcomes are limited. Negative implications can include violence and aggression, risky sexual behavior, substance use, and disordered eating.

Violence and Aggression – violence in media does not depict the reality and in turn glorifies and downplays the negative aspects and to some extent may even depict it as humorous, which the adolescents will find difficult to untie from reality. Music videos, rap music, and video games have become increasingly violent. Interactive media such as online games can encourage antisocial beliefs and behavior in adolescents. A recent analysis of video games by Anderson et al. revealed that more than half of all games contain violence, including >90% rated as appropriate for children aged 10 years and above.Repeated exposure to media violence can lead to the acceptance of violence as an appropriate means of solving conflict and desensitization, which will lead to an increase in aggression and decrease in altruism. According to Bushman et al., the relationship between exposure to media violence and real-life aggression is nearly as strong as the relationship between cigarette smoking and lung cancer.

Risky sexual behavior – digital technology plays an important role in providing sexual information to adolescents and shaping their beliefs. Older technology had restricted access to pornography, but with newer technologies, it is easy to access. During adolescence, nearly half the internet users have been exposed to online pornography. A study by Brown et al. found that adolescents’ exposure to sexually explicit content predicted the perpetration of sexual harassment, more permissive sexual norms, having oral sex, and engaging in sexual intercourse while in high school. Social networking websites enable adolescents to present themselves publicly, sometimes in very sexually aggressive ways. The newer thing which is fast picking up is “Sexting”, which is sending, receiving, or forwarding sexually explicit messages, photographs, or images primarily by phones using an application. These apps claim to maintain privacy which tempts adolescents to explore.

Substance use – research has shown that adolescent substance use has a significant impact. A considerable amount of information regarding alcohol and drugs are available in online videos. Much of the content in videos portray only beautiful side of the picture, neglecting the dark side. The portrayal of tobacco and alcohol in movies has important implications. Adolescents try to identify themselves with the storyline and the characters, thus increasing their chances of exploring the substances. Even though restrictions are laid down by the Central Board of Film Certification on portraying smoking and alcohol, movies tend to show them with a small note at the bottom, which is taken in a lighter way by audience. In social networking sites, there are various chat rooms available to discuss on substances of abuse since there are no restrictions it can be left to the imagination as to what would go into discussion. A longitudinal study by Dalton et al. has found that exposure to movie smoking in adolescence can predict the initiation of smoking 1–8 years earlier. Newer technologies are paving way to easily harness use of dark web, through which newer substances of abuse are becoming available called as “Designer Synthetic Drugs.” They are supposed to be more potent and possess unknown long-term effects but predicted to have potentially severe effects, to name few “spice,” “bath salts,” “2C family,” etc.

Disordered eating habits – there is a vast amount of food-related content online, with potential to significantly expand and deepen adolescent’s exposure to food marketing messages. Aggressive marketing strategies are being used by the food-producing/delivery companies using newer technologies to change the habits of viewers and promote their products. Thanks to the technologies which change our diets, changes which could be seen are disappearing of our traditional foods and the entry of Western foods. Much of the newer foods use are inspired from Western cuisine, such as using of cheese, mayonnaise, and olive oil in place of ghee, lassi, and traditional sweets. The West are already facing many challenges such as obesity due to their food habits and inclining to change, wherein we are welcoming their food habits. Artificial intelligence is evolving and finds significant place here; everyone would have experienced that after a certain search there would be a lot of similar suggestions displayed even after leaving the particular page, which in turn tempt us to fall in trap.

Research has found a link between technology use and a range of mental health issues which include depression, social phobia, suicidal thoughts, attention deficit hyperactive disorder (ADHD), and cognition.

Depression and Technology – a recent study among adolescents found that compulsive Internet use and depression mutually reinforce each other. Spending too much time on the internet appears to predict later depression and other emotional problems, which in turn lead to an increase in Internet use. Depression has been postulated to be caused by substituted digital communication, such
as excessive mobile phone use that takes the place of a face-to-face contact and causes subsequent social isolation. A longitudinal study of adolescents found that a greater use of mobile phones at the baseline associated with the higher levels of depression 1 year later.

Anxiety disorders and Technology – emotional regulation is an important skill that is developed in childhood and adolescence. Individuals learn to handle and cope with strong emotions by experiencing them and developing internal regulatory processes. When emotional regulation does not develop, it can lead to a variety of psychopathological disorders, especially anxiety disorders. Adolescents seek digital distraction from emerging anxiety/distress emotions, creating a reinforced behavioral avoidance of emotional experience. The research has shown that individuals with Internet overuse report of using it to avoid negative emotions such as anxiety. Hence, technology use can act as a dysfunctional regulator of emotional distress. Some individuals suffering from social anxiety disorder prefer technological options such as texting, instant messaging, and e-mailing rather than face-to-face interaction; the behavior is understandable, but this may actually reinforce making them even more avoidant. This might worsen the symptoms and severity of social anxiety disorder.

Suicide and Technology – suicide with technology use can be linked with cyberbullying, and increased Internet use, in general, can increase suicidal thoughts and self-injurious behavior. Cyberbullying is seen in adolescents using social networking websites. Its prevalence varies from 11% to 48% based on the definition used. Cyberbullying increases the risk for a wide range of mental health problems. Many experience negative feelings such as embarrassment, fear, and self-harm/suicide. The Internet exposes adolescents to stories and conversations about suicides and such exposure, especially in the form of discussion forums, increases suicidal ideation. Discussion issues related to suicide and self-injury provide youth with details and potential support through normalization of the behavior, exposing them to high-risk situations.

ADHD and Technology – there are contrasting studies that point toward positive as well as negative aspects of use of technology in adolescents. A study by Klingberg et al. showed that working memory can be improved by training in children with ADHD by computerized, systematic practice of working memory tasks. This training improved response inhibition and reasoning and resulted in reduction inattentive symptoms. Another study by Vadlin et al. found that gaming had negative effects on adolescents, in particular those with ADHD. Boys had more than eight times the probability of ending up in problematic gaming. Similarly, Weinstein et al. found that adolescents with ADHD had higher scores on Internet addiction test, used Internet for longer periods, and went to sleep late than those without ADHD.

Cognition and Technology – a study by Park et al. determined that adolescents addicted to the Internet had lower IQ scores in several areas, most noticeably in comprehension and vocabulary; however, they could not come to a conclusion that lower cognitive performance was a result of being addicted to the Internet or that those with cognitive deficits are more prone to Internet addiction. A longitudinal study by Fiorini et al. proved that children’s computer use had effects on cognition. Mai et al. did a study focused on maladaptive cognitions; they found that adolescents who had a belief that their online self is better than real self are more prone to get addicted to the Internet.

There are positive implications of technology as well, which can be used constructively by adolescents in social interaction, online journaling, blogging, photography, and other pursuits. Some of the constructive applications of technology related to mental health would be-

Detection of mental health disease – Technology can be used to detect if there is a behavior change that may indicate a person is transitioning from a healthy mental state to a risk state. An example of use technology in detecting disease could be “The Big Black Dog” app. It is designed to detect the onset of depression by identifying the behavior change by monitoring the phone and technology use.

Telemedicine – there is a gap in the available mental health professionals and the needs of the society. This gap is particularly notable in rural and poverty-stricken areas. This can be overcome by the use of technology to bridge the gap. Of course, we cannot completely bridge the gap, but to some extent, it can be attempted. Telemedicine seeks to improve a patient’s health by permitting two-way, real-time interactive communication. This can be utilized in a number of settings such as primary health centers and schools.

Online therapy – Internet-based cognitive behavior therapy has been studied in both adults and adolescents; it offers a unique, effective, and cost-effective strategy in treating depression, anxiety, and other mental health disorders. One meta-analysis of 23 adult randomized controlled trials comparing the effects of computerized cognitive behavioral therapy (CBT) versus face-to-face therapy for anxiety disorders reported a large effect size over control conditions; computerized CBT on the whole
was as effective as the face-to-face CBT. Some of the internet-based CBTs are already available and are running, such as the MindSpot Clinic.

As clinicians and academicians what can we do?
- Counsel parents to help guide adolescents to appropriate content
- Counsel parents to give adolescents ample time to practice face-to-face communication and to limit online communication
- Educating the parents to develop strategies and implement family rules about technology use
- Restricting the use of technologies or avoiding them below a certain age
- Reducing the exposure of adolescents the time spent in front of the screen, i.e., screen time.

More research is required to understand the long-term effects of technology on adolescents. As adolescence is still a developing age, it is difficult to determine whether brain structures and functions can be permanently altered. As the concept of technology is itself changing and moving away from screens, mobile phones to virtual screens, and wearable devices such as eyeglasses, researchers need to continue exploring the effects of these on adolescents’ mental health.

Ravi Shankar Pasam
DPM, DNB, Head of the Department of Psychiatry, Konaseema Institute of Medical Sciences, Amalapuram, East Godavari, Andhra Pradesh, India

Address for correspondence: Dr. Ravi Shankar Pasam, Flat No 504, Sneha Sowda Apartments, HNO 12-1-36 Jawhar Street, Kakindada - 533 001, Andhra pradesh, India.
E-mail: ravisabkarpasam@gmail.com

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