



Impact of Smartphones on Physical and Psychosocial Well-being of Children and Adolescent

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Since the last two decades, the risk factor of various diseases has spiked up among the children and adolescents, which has an immediate alliance to the increased use of smartphones. Previously children used to lag behind their adults for possession of smartphones, but with ease of accessibility in succeeding years, smartphone ownership among teens has jumped to 72% with unnecessary prolonged screen time durations.

The objective of this literature review was to highlight and refresh the slow poisoning effects of the smartphones in our younger generation due to its compelling traits which make them use it for a long time carelessly.

Keywords: Smartphones; children; adolescents; youth; young adults; smartphone dependency; postural defects; behavioral issue; phubbing.

1. INTRODUCTION

It has been noticed that in more than 80% of the adolescents screen-time is increased usage due

to excessive usage of cellphones and are exposed to its dangerous radiation since pre-natal life [1,2]. None of the former generation has been exposed to this kind of radiation during their

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childhood and adolescent time [3]. The extended period of vulnerability to cell phone radiation has led to damaging changes at cellular level in the youths of today which is more menacing to health than smoking cigarettes [4]. This technology is a source of speedy information and instant communication yet it is linked with complicated downsides such as changes in behaviors of young adults, their activities and it is also a leading cause of emergence of new diseases [5,6]. Half of our youth confessed to use smartphones endlessly and the other half reported on getting online multiple times every single day [7].

With ease of access to the cellphones in this century, around 96.6% of children are getting hold of it and most of them started using before the age of one [8,9]. This early age exposure which was approximately 70% was due to parents handing over the device to their children themselves, so that they are able to run household chores without any interference from the young ones [8,9]. The present day adulation of smart phones use among adolescents is associated with lifetime of exposure and accompanying illnesses which has spiked up by 3-4% [10]. A survey was conducted among 11 different countries in regard to smartphone usage effects on children, out of which the majority of the population of 8 countries suggested it as a bad impact on children [5]. Consumers of smartphones in the 21st century are spending an alarming amount of time with the gadget to the extent that they cannot imagine their existence without it [11]. As it has become a consequential part of their life, this invisible dependence to smartphones for maintaining social life, communication or for educational purpose comes with its undue negative consequences and is basically entitled as a behavioral addiction [11,12]. An analysis carried out back in 2006 promulgate that children who were exposed to cell-phones prenatally and immediately postnatally have been kindred to have behavioral difficulties by the age of 7 [13]. Apart from psychological aspects, the mechanical load of this technology is linked to slow process postural defects leading to modified tendon and connective tissue adaptation whose risks are associated with head, neck, arm, shoulders, back and overall musculoskeletal health of juvenile population [14].

The pitfall of smart phone exploitation by our young generation has received a lot of contemplation in recent years. In context with

given statistics, this review article will profoundly shed light on the negative side effects of the excessive smartphone usage and its association to children plus adolescents' health correlating the difficulties they are facing not only psychologically but physically both. All these symptoms discussed will educate the readers about the warning signs in order to foster early detection of the consequences and subsequently be able to monitor their screen time.

2. METHODOLOGY

Data gathered for this article review about the impact of smartphones on physical and psychosocial well-being of children and adolescents was conducted through multiple electronic databases. Take in consideration were PubMed, Research-Gate, Google Scholar, Medline, Academia and public search engines like Google Search. Relevant keywords such as, 'smartphones, children, adolescents, youth, young adults, smartphone dependency, postural defects, behavioral issue, addiction, phubbing, and excessive usage', were used to gather appropriate information from 45 different articles. All had similar study on adolescents' health related to cellphones. Articles selected had their data collected through random selection technique on school going children.

3. DISCUSSION

Smartphones being an indispensable part of modern telecommunication, entertainment and educational access is being used in every individuals' life [15]. The latest version of smartphones has additional features which make them more appealing to the younger generation [8]. With increase in smartphone use there is an increase in the incidence of harmful effects on health, which on the longer run may lead to major health implication [15]. All the adverse effects are mainly associated with the duration of screen time rather than the type of content itself [14,15]. A survey in Thailand highlighted the increase of screen time among the children from 35.9% in 2010 to 69.6% in 2018 in the age group 6-14 [16].

4. POSTURAL DEFECTS

All the adverse effects are mainly associated with the duration of screen time rather than the type of content itself [14,15]. A research study was conducted to evaluate the excessive prolonged use of smartphones in relation to

musculoskeletal problems and postural modification with its corresponding effects on the respiratory function [17]. Recent analysis in Canada unveils smartphone users tend to complain neck, shoulder, and thumb and back pain which aggravates with increased use [18].

Young adults tend to concentrate on these relatively small screens of smartphones for a long time and are more inclined to bend their necks or adjust their posture in an inappropriate manner which develops severe problems [17,19]. These handheld devices are one of the major causes of thoracic kyphosis, sustained forward neck, rounder shoulders and slouched posture which is associated with injuries to ligaments in addition to cervical and lumbar spine [17,20]. Investigation carried out by Korean university corresponded to all these structural predicament was due to faulty posture is also linked to development of respiratory dysfunction and 83% already experienced transformation in breathing pattern [17,21,19].

Compared to normal sitting and standing pose, slouched sitting position or kyphotic posture due constant use of smartphones significantly lower and can impair the respiratory function [17].

Pain in neck was due to increase in cervical angles, while rounded shoulder was due to lower scapular index in young adults using smartphones for more than 4 hours every day [17,22]. Rounded shoulders was further associated with a sedentary lifestyle in relation to excessive smartphone usage [17]. Further investigations done on breathing functionality, revealed lower values of peak expiratory flow, forced expiratory flow and forced expiratory capacity [17].

A recent study reported development of prominent exostosis emerging from the external occipital protuberance in young adults which is also kindred to prolonged screen time of these smartphones especially in adolescent males when compared to the females in accordance with their time consumption by these gadgets [14,23].

5. COMPROMISE IN PHYSICAL ACTIVITY

Smartphones with advantage of being portable and wireless can be used freely while walking, standing and even during mild to moderate physical activity all these characteristics doesn't support sedentary lifestyle yet its prolonged

screen time consumption by children and young adults leads to low energy expenditure and eventually a predisposing factors for obesity, impaired lipid profile, cardiac diseases and glucose [24,25,26]. People tend to use cell phones 10 minutes less while standing compared to when sitting or lying down [17].

A review done on US teens during 2013 to 2015 brought to attention the association of increased screen time with unhealthy lifestyle. Around 20% of teens spent their time in front of the screens for more than five hours per day in addition to that 3% were linked most likely to get obese due to increase consumptions of sugary drinks, not enough sleep and lack of exercise [27].

6. MEDICAL ISSUES ARISING DUE SMARTPHONES' ESCALATED USE

Several publications have emphasized on the probable negative effects of smartphones yet a new finding came into light of the medical field which was neglected previously was hemorrhoids associated with the use of excessive smartphones [28,29]. A survey conducted on university students in 2019 exhibited 96% of the generation Z who are younger than 23 years would not use the bathroom without taking their smartphones inside with them and were entitled as "young adults who are chained to their handheld devices" [29,30]. This negligent act is an emerging cause of hemorrhoidal diseases that seriously impairs the quality of life in the long run [28]. Smartphones' lavatory syndrome is the term designated to the hemorrhoids in people who spent increase sitting time on the toilet rim causing escalated unnecessary pressure at the pelvic floors, lower rectum anal region and straining while defecating [28,29]. Adolescents prolong time in the toilet rim which is more than 20 to 30 minutes exaggerated the hemorrhoidal diseases and is now a routine question asked by the doctors when any patient presents with lower gastrointestinal tract symptoms [29].

The harmful low grade radio frequency emitting from the cell phones also increases the risk of brain tumors in children as they are still at the developmental stages of their lives which absorbs these radiations in the brain and apoptosis at gene expression level is expected [31]. Studies are still being conducted for thorough associations between these critical factors and incidence of brain tumors [31].

7. PSYCHOSOCIAL REPERCUSSIONS

A Danish study reported behavioral difficulty among the children of age 7 who were exposed to cell-phones pre and postnatal [32]. In spite of the positive influences of smartphones, emerging research has interpreted the relationship between various variables related to health and smartphones as being 'problematic' [24]. Smartphones over used and internet over used are both coordinated with the problematic usage among adolescents between ages of 13 to 20 [33,34].

A cross sectional study in 9 different secondary schools of Madrid unfolded almost 96.5% students had their own mobile phones out of which 46.1% kept it on during classes while 41.7% were intensive users [34]. Studying online in schools or off schools are common practices now, that has positive impact yet is also associated with decreased academic performances for some considerable amount of students as most likely they tend to get distracted quickly [35,36].

Problematic users have addiction like behavior which has been linked to poor sleep habits, anxiety, depression, fatigue, headaches, memory loss, isolation and unhealthy lifestyle [24,37,38]. Moreover the increased rate of smartphones use in university students is also related to development of characteristic traits like extraversion and neuroticism [39].

Evidence based researchers have shown mental laziness due to smartphone overreliance which has given ease to store information outside the brain in addition to ease of brainstorming for basic known knowledge, this dependency has potential long term pessimistic repercussion on brain [40].

Smartphones' dependency and phubbing in children and adolescents has a significant association with parental phubbing as it increases the likelihood of perceiving it as a norm [41]. This habit of snubbing someone because of indulgence in a smartphone has an indirect connection with depression, and distress while direct connection with relationship resentments and is found to be offensive by most of the people [42,43]. Highest phubbing statuses has been noticed among college students mainly from smartphone addiction [42].

8. EVOLVING COMMUNICATION TREND AMONG YOUTH

Over the last two decades the use of smartphones to communicate has exorbitantly increased, which have also changed the way to communicate as many users would use instant messaging through smart phones which they wouldn't presume to say in person or on voice over [44,45]. Immoderate use of smartphones among younger children has given rise to a new type of social anxiety which avoids the process of in-person interaction and hinders the fabrication of social skills [46]. Children would give preference to using smartphones, to avoid everyday conversation which has made them accustomed to look at their cellphones rather than to talk with the person sitting next to them and this act eventually loses the drive to communicate [46]. An observational study carried out in 2005 revealed 46% rise in technology use for conversation over in-person meet ups which has significant impact on person's relationship enhancement, as youth of this generation is more comfortable to address an inadmissible situation over a text message [45].

Furthermore the reading activity in youngsters has gone through a drastic decline over the past decade which is mostly replaced by social media influence in today's population, 20% of the youth statistics' revealed indulgence in book reading while majority 80% were busy using their smartphones [47].

Enhancement in vocabulary that is directly proportional to the book reading ultimately gives ease to express one's thoughts and feelings in a much refined way which is hampered with the uncurbed use of smartphones in early childhood [48]. Adolescents living in today's era where smartphones is an integral part of their lives are losing patience during real time conversation and have dwindle aptitude of a good listener as they are in age of internet and headlines, where they are used to of instant gratification and getting piece of the information to their liking in a short burst [49].

Fig. 1 shows the aforementioned and subsequent downside of our youth due to exorbitant use of smartphones. And Fig. 2 shows the changes in accessibility to smartphones together with time duration in children and adolescents in succeeding years.

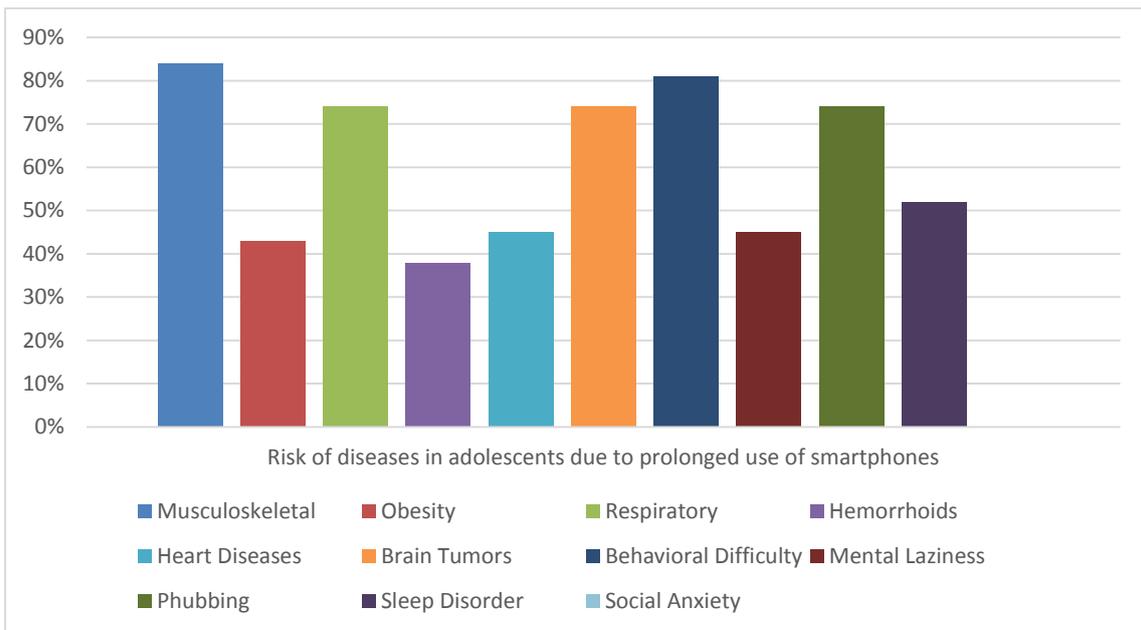


Fig. 1.

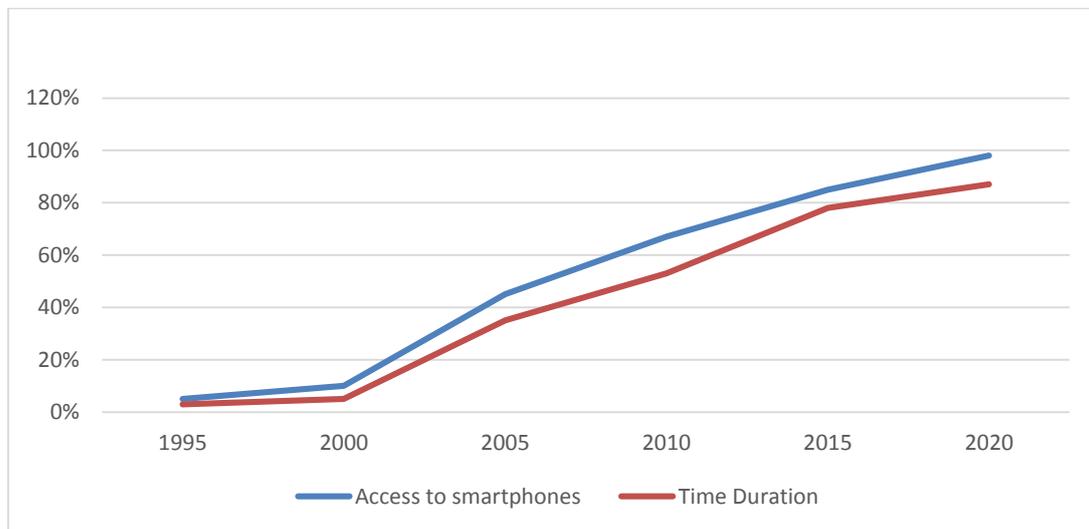


Fig. 2. Percentage of smartphone access

9. INFLUENCE OF SMARTPHONE SURGE AMONG PAKISTANI YOUTH

Smartphones seem to be in the category of necessity in today's world and the numbers of users in Pakistan has also escalated [50]. There is a significant increase in usage of smart phones among young adults of Pakistan which comprises 70% of the total population [50]. Back in 2010 a study survey was conducted in school going children of Pakistan and 72% were habitual users of smartphones [51]. A former

evaluation on adolescents' showed Pakistani youth are also experiencing same side effects of smartphone as children and young adults of other part of the world, but for now they have not exhibited any sign and symptoms of extreme problematic addictive behaviors and are still able to line boundaries among priorities, commitments and smartphone screen time [50,51]. Even so there is striking evidence of behavioral and psychological issues between school going children and imprudent use of smartphones [51].

10. CONCLUSION

Addiction to smartphones in this fast moving world is spreading like wildfire especially among our youth. With all the benefits and conveniences we must also consider the potential negative effects that advances with its excessive use. This literature review summarizes some of the substantial drawbacks due to excessive usage of smartphones by children and adolescents of this generation that embraces the tangible magnitude of smartphone epidemic in today's living.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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