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Dr. Anita Atwal

Associate Professor,

Bhagat Phool Singh Institute of

Higher Learning (BPSIHL),

Bhagat Phool Singh Mahila

Vishwavidyalaya (BPSMV),

Khanpur Kalan, Sonipat,

Haryana, India

To study impact of internet on psychological well-being of adolescent

Dr. Anita Atwal

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Abstract

A wide range of age groups, socioeconomic classes, and illiterate are among the population of internet users. Its unique feature to offer something or other to every user gratifies them to use it again. People utilise it for a variety of purposes, including socialising, shopping, banking, problem-solving, entertainment, and education. When used excessively, it can cause addiction and harm to those who use it. However, social media also has some good effects on users' lives; for example, many utilise these platforms to overcome feelings of loneliness and sadness, and the freedom of expression they have on these platforms gives users a sense of contentment. Furthermore, it wouldn't be incorrect to argue that increased usage has a significant impact on users, both positively and negatively.

The impact of internet on physical health, mental health, social life and academics on adolescents is also creating an alarming situation. Problematic internet use with FOMO and use of social networking sites with adverse impact is nowadays very common among the students. The study is aimed to find out the positive and negative Impact of Internet on mental health of adolescent. The study sample consisted of 400 higher secondary school students Sonipat, age ranging 13-18 years drawn randomly. Findings of the present study was Communication skills got better by using internet, it is a important and useful tool in current scenario. felt relaxed after using internet, for entertainment purposes was high Impact and internet controls the mood, felt confident, express themselves, follow the popular internet trends was moderate impact and felt fear of missing out if did not post anything on social media was low Impact of internet on mental health of adolescent.

Keywords: Adolescent, internet addiction, psychological health, social media, FOMO

Introduction

When Facebook was introduced in India in 2006, the social media revolution got underway there. People from all around the world were connected by it. Twitter, Facebook, Instagram, LinkedIn, YouTube, and WhatsApp are a few of the most widely used social networking sites. Globally, there were 3.96 billion active social media users, and that number was rising annually by about 11% (Dean, 2021) [3]. In addition to being employed for social networking and communication, these platforms are also utilised for acquiring new skills, news acquisition, business, family ties maintenance, education, shopping, entertainment, and politics (Singh, 2020) [12]. Illustrated the diverse ways in which our society uses the internet. Most daily tasks are completed with it, and over time, it has taken up room in every home. Overuse of the internet could potentially affect the health of adolescent.

The regular spend time on internet means the increased screen time. That may possibly cause strain in eyes, back ache, spinal discomfort, headache, neck pain, and lack of sleep and so on. These issues are connected with other severe physical health related issues. (Güzel *et al.*, 2018) [5] found a correlation in internet addiction and physical health and causes physical discomfort like backache, stiffed body, head, neck pain and insomnia. Users' vision is harmed by digital strain in their eyes. Extended periods of screen time impair eye blinking, which leads to the evaporation of tears that are meant to shield the eyes. Additionally, using a mobile device compels the user to see content in smaller font sizes. Additionally, this strains the eyes 10 times. NWPC Blog Teenagers are engaging in less physical activity as a result of this convenient, calming, and amusing technology. Instead of playing on fields or anywhere else, they are instead playing games online. Lifestyle disorders like obesity gained momentum as a

Corresponding Author:

Dr. Anita Atwal

Associate Professor,

Bhagat Phool Singh Institute of

Higher Learning (BPSIHL),

Bhagat Phool Singh Mahila

Vishwavidyalaya (BPSMV),

Khanpur Kalan, Sonipat,

Haryana, India

result of this physical inactivity. Nonetheless, there are websites, mobile apps, and Vlogs that encourage teens to maintain their physical health and help them stay in shape.

They are encouraged to keep up their fitness by the option to tag celebrities and online influencers. They might win over the celebrities and online influencers they follow by doing this, and their post might be republished on their social media accounts. For instance, tagging celebrities like Malika Arora, Shilpa Shetty, Milind Soman, or other social media influencers in selfies or self-films of themselves performing yoga poses so they might appear on their "Insta stories." Thus, it would not be incorrect to presume that teenagers' use of the internet contributes to their continued physical fitness and well-being. The amount of online friends compared to in-person friends is higher in the social media age. Adolescents engage with social media to live their spurious lives. It has become a pretend for everyone. To post a picture prior doing anything *viz.* eating, sleeping, travelling, shopping, meeting, or anything else is imparted utmost care. According to (Jahoda, 1953) ^[7] psychological health can be a continual search of satisfactions in one's life. However, the internet is helping them to search for what they want in their life. The abundance of variety of content available on internet has caused significant disruption among adolescents. On the one hand it gives them pleasure and satisfaction to share their feelings through posting something on social media and on the other hand they even feel jealous and depressed by watching other's post. It has also created a pressure among them to share something unique and different on their social media account. This leads to the cyber bullying and cyber pornography. Additionally, it establishes a foundation for anxiety, depression and social isolation. (Tripathi, 2017) ^[15] mentioned that internet addiction is correlated with many psychiatric disorders like stress, low self-esteem, impulsivity, poor sleep quality, social phobia and many more. (Romano *et al.*, 2013) ^[11] found that use of internet provides a negative impact on positive moods of internet addicts. Jackson, von Eye, and Blocca, 2003 ^[6] found that the multiple logins provide negative impact on psychological health of teenage internet users. This can be understood that the excessive use of internet among adolescents has more negative impact on its users than the positive ones. (Lakshmana, Kasi and Rehmatulla 2017) also studied internet use among Indian adolescents and pointed out their risk-taking behavior of them while using the internet.

The study made clear how crucial it is to monitor teenagers' internet behaviour and provide parental guidance in order to prevent spoiling of adolescents. Technology advancements are beneficial to humanity, but if not used wisely and appropriately, they could also turn into a nightmare. This indicates that research on teenage internet use in India is desperately needed. The impact of Internet exposure on senior secondary students' academic achievement, psychological well-being, social health, and physical health in the Sonapat district was investigated as a result of this. The study will

throw the light on senior secondary students' internet usage habits and their impact on their lives.

Objectives

1. To analyze the impact of internet exposure on students' psychological health.
2. To know about the significant differences in the impact of the internet on mental health of the senior secondary students of Sonipat district in relation with different variables.
3. To provide suggestions for alleviating the adverse effects of internet usage on the mental well-being of adolescents.

Research Methods

The study is primarily dependent on primary data collected with the help of personal interview schedule and self-structured questionnaire regarding impact of internet exposure on student's mental health. The coded data was analysed using various statistical measures. The computer applications that were used to analyse the data were M.S. Excel and SPSS (Statistical package for Social Sciences). The statistical measures used for data analysis are as follows:

Table1: Statistical Measures Used for the study

| Content | Statistical measures |
|---------------------------------------|---------------------------------------------------------------------------------|
| Demographic Profile | Frequency and Percentage |
| Impact of Internet on various aspects | Frequency and Percentage, Intensity indices, t-test, ANOVA and Posthoc Analysis |

Target group and locale of the study

A study has been carried out with the younger adolescents who were studying in higher secondary schools of Sonapat. Total number of respondents were 400. Random and convenient sampling techniques were used.

Limitations of the study

The sample size was 400 only. The study was confined to Sonipat district of Haryana State.

The study was restricted to young adolescents only.

Result and discussion

The present study aimed to study the internet usage among senior secondary students and its impact on their psychological health. The below given table indicates the overall impact of social media on mental health of senior secondary students of Sonipat district.

Table 2: Overall Impact of Internet on mental Health of Senior Secondary Students (N=400)

| Impact on Psychological Health | Frequency | Percentage (%) |
|--------------------------------|-----------|----------------|
| High | 152 | 38.0 |
| Moderate | 166 | 41.5 |
| Low | 82 | 20.5 |

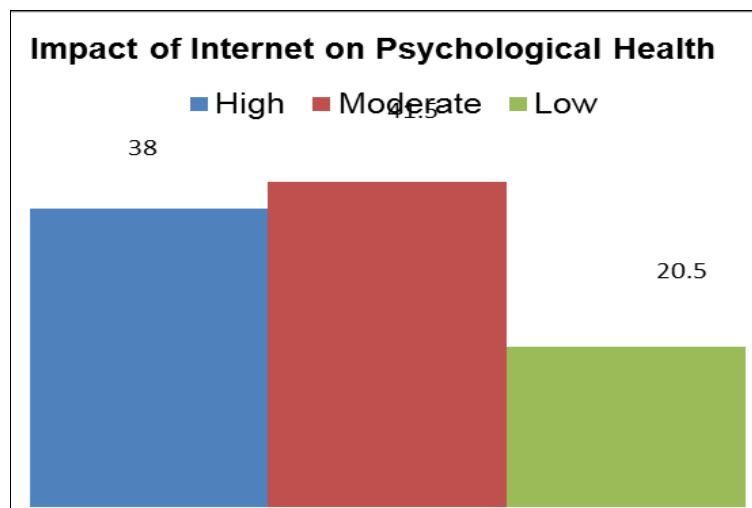


Fig 1: Percentage Distribution of Senior Secondary Students According to the Impact of Internet on their mental Health (N=400)

Table 2 indicates that 38 percent of senior secondary students reported a high impact of the internet on their psychological health, which is little less than forty percent. Nonetheless, a fifth of them indicated that the internet had a minimal impact on their psychological health (20.50%), and over forty percent had a moderate impact (41.50%). This demonstrates that the majority of senior secondary students' internet use had a high to moderate impact on their mental health. This is a

concerning discovery that highlights the negative impact of the internet and its addiction among these people. (Cabrera et.al. 2019) ^[2] also found problematic internet usage among the adolescents who were using social networking sites. This highlights the role of social networking sites in creating psychological impact among the adolescents. (Feng and Zhong 2019) ^[4] highlighted the positive correlation between the stress, social anxiety and internet addiction.

Table 3: Intensity Indices for the Impact of Internet usage on Psychological Health of Senior Secondary Students (N=400)

| Impact | Statements | I. I. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------|
| High Impact | Communication skills got better by using internet. | 4.01 |
| | Internet is an important thing in current scenario of pandemic. | 4.00 |
| | Felt relaxed after using internet for entertainment purposes. | 3.89 |
| Moderate Impact | The content on internet controls the mood viz. being happy, angry, irritated, and so on. | 3.59 |
| | Felt confident enough when I have internet in my phone. | 3.47 |
| | The news shared through the internet was trustworthy. | 3.31 |
| | Felt anxious if internet is not available in phone. | 3.28 |
| | Considered social media as a platform to express self. | 3.24 |
| | 'Hashtags' (#) on internet influence the opinion for situations or people. Like #justice for SSR, #me too, #zero tolerance, etc. | 3.16 |
| | Follow the popular internet trends. e.g. trends like "rasode mein kaun tha", "pawri ho ri hai", "ice bucket challenge", "kiki challenge". | 2.89 |
| | Felt stressed if not using social media. | 2.71 |
| Low Impact | Felt fear of missing out (FOMO) if did not post anything on social media. | 2.35 |

Table 3 shows the intensity index for the impact of internet on the psychological health of the senior secondary students of Sonepat district. It demonstrated that the internet's influence on the chosen students' psychological well-being ranged from high to low. The intensity indices were 4.01 to 2.35 in range. The greatest index (4.01) showed that utilising the internet improved communication skills. This demonstrates the advantages of the internet. Additionally, significant effects were observed for the significance of internet access during pandemic (4.00) and the calming sensation experienced following entertainment-related internet use (3.89). These results demonstrate the importance of the internet during pandemics and its function in providing people with pleasure. The COVID-19 pandemic hit the entire world at once and drove people to stay at home. The offices, schools, and services were operating through the internet. The administrator of the children's school led their online classes. The professional life continued on thanks to the internet, which saved the day. Online learning was used by the students, virtual classrooms were used to share course materials, and online testing and evaluation were also

conducted. As a result, the senior secondary kids considered the internet to be a valuable resource in their home.

Furthermore, the internet showed moderate impact for the following

- Content on internet controls the mood (3.59)
- Having internet make one feel confident (3.47)
- News shared through the internet are trustworthy (3.31)
- Social media is a platform to express self (3.24)
- 'Hashtags' influence the opinion of people (3.16)

Follow the popular internet trends (2.89)

The aforementioned information indicates that senior secondary students regarded the internet as a significant resource and emphasises how it affected their online behaviour, attitudes, and emotions. This data suggests that senior secondary students used the internet for a variety of purposes, which had a moderate impact on their perceptions of other people, situations, and themselves. Nevertheless, research also demonstrated that their use of the internet had a

moderate impact on their stress levels (2.71) and anxiety levels (3.28) if it was unavailable on their phone. Thus, the internet was helping them feel self-assured and gave them a platform to express themselves; nevertheless, its unavailability was also causing them to feel worried and agitated.

Moreover, the table further highlighted the low impact of internet for only one statement, “FOMO of not posting anything on social media” (2.35). This means the senior secondary students were not feeling FOMO (fear of missing out) if they post nothing on social media. Peer pressure and

influence can cause FOMO, which can negatively impact students' psychological well-being. The low intensity index for this was shown by the current data, nonetheless. This indicates that the senior secondary students' regularity of social media posting had no effect on them. According to (Cabrera *et al.* 2019) [2], students pursuing higher education had a moderate level of FOMO.

The excessive use of internet may lead to problematic internet usage and internet addiction among students. It might affect their psychological health. (Maheshwari and Preksha 2018) [10].

Table 4: Differences in Impact of Internet on Psychological Health of Senior Secondary Students (N=400)

| Variables | Source of Variance | Sum of Squares | DF | Mean Square | F | Sig. |
|--------------------------|--------------------|----------------|-----|-------------|--------|-------|
| Age | Between Groups | 2.997 | 2 | 1.4985 | 2.4801 | 0.08 |
| | Within Groups | 239.873 | 397 | 0.6042 | | |
| Stream of Study | Between Groups | 1.7944 | 2 | 0.8972 | 1.4774 | .229 |
| | Within Groups | 241.075 | 397 | 0.6072 | | |
| Mother's Education | Between Groups | 6.0089 | 3 | 2.003 | 3.3487 | 0.01 |
| | Within Groups | 236.861 | 396 | 0.5981 | | |
| Father's Education | Between Groups | 2.212 | 3 | 0.7373 | 1.2133 | 0.304 |
| | Within Groups | 240.658 | 396 | 0.6077 | | |
| Mother's Occupation | Between Groups | 1.6739 | 2 | 0.837 | 1.3776 | 0.253 |
| | Within Groups | 241.196 | 397 | 0.6075 | | |
| Father's Occupation | Between Groups | 2.212 | 3 | 0.7373 | 1.2133 | 0.304 |
| | Within Groups | 240.658 | 396 | 0.6077 | | |
| Number of Family Members | Between Groups | 4.2647 | 2 | 2.1323 | 3.537 | 0.02 |
| | Within Groups | 244.115 | 405 | 0.6028 | | |
| Type of Family | Between Groups | 10.801 | 2 | 5.4007 | 10.137 | 0.01 |
| | Within Groups | 211.50 | 397 | 0.5328 | | |
| Number of Siblings | Between Groups | 3.9192 | 3 | 1.3064 | 2.165 | 0.09 |
| | Within Groups | 238.95 | 396 | 0.6034 | | |
| Internet Usage | Between Groups | 39.814 | 2 | 19.907 | 38.920 | 0.01 |
| | Within Groups | 203.05 | 397 | 0.5115 | | |

$p < 0.01, p < 0.05$

Table 4 presents the results for analysis of variance regarding the impact of internet on psychological health of senior secondary students of Sonapat district. It shows that the significant difference was there in the impact of internet on psychological health of them in relation with their mother's education, type of family, number of family members and also their internet usage.

This suggests that the effects of the internet on mental health differed depending on the previously identified factors. In contrast, there was no discernible difference in the individuals' age, field of study, father's educational background, parent's employment, or number of siblings. That indicates that the internet had the same effect on their psychological well-being regardless of their age, field of study, father's level of education, parent's employment, or the number of siblings they had. As a result, the null hypotheses, which claimed that there would be no appreciable variations in the effects of the internet on the psychological well-being of senior secondary students in the Sonapat district based on

their peers' educational backgrounds, family structures, and internet usage, were rejected. The findings show that their mother's level of education, the kind and size of their family, and how much time they spent online all had an impact on how they felt about their psychological well-being. The mother would be aware of the detrimental psychological consequences of the internet on teenagers if she had a sufficient level of education. She would therefore make an effort to limit their children's internet usage. Nonetheless, there may be comparable reasons for both the size and style of family. Sometimes parents in small-scale or nuclear families don't have enough time to spend with their kids. As a result, their child may experience loneliness and use the internet more, which can have a negative effect on their mental health. The reason for such finding could be the purposes for which they were using internet i.e., education, entertainment and socialization. The same need for using internet indicates the similar impact of the same on their psychological health.

Table 5: Post Hoc Tukey's HSD Comparison for Impact of Internet on Psychological Health of Senior Secondary Students (N=400)

| Variables | Variable I | Variable J | | HSD Mean Diff. | Sig. |
|-------------------|-----------------------|------------------|----------|----------------|--------------------|
| Mothers Education | Illiterate (2.86) | Highly (3.57) | Educated | 0.71 | Q = 4.47 p = 0.01 |
| Type of Family | Joint Family (3.72) | Nuclear (3.39) | Family | 0.33 | Q = 4.67 p = 0.01 |
| | | Extended (3.27) | Family | 0.44 | Q = 6.33 p = 0.01 |
| Internet Usage | High Usage (4.03) | Moderate (3.43) | Usage | 0.6 | Q = 7.70 p = 0.01 |
| | Moderate Usage (3.43) | Low Usage (2.99) | | 1.04 | Q = 13.32 p = 0.01 |
| | | Low Usage (2.99) | | 0.44 | Q = 5.62 p = 0.01 |

$p < 0.01$

Table 5. shows the posthoc analysis for the impact of internet on the psychological health of the senior secondary students of Sonapat district. It shows the comparison of variables. It shows that the significant difference in impact of internet on psychological health of students existed between children of illiterate mothers and those whose mothers were highly educated ($p=0.01$). The mean score was high for highly educated mothers (3.57) that their illiterate mothers (2.86). The high mean score suggests that senior secondary pupils' psychological health is significantly impacted by the internet. Additionally, it was demonstrated that there was a statistically significant difference ($p=0.01$) in the influence of internet use on students' psychological health between those living in joint families and those living in nuclear and extended families. In contrast to pupils living in nuclear families (3.39) and extended families (3.27), those living in joint families demonstrated a higher mean score (3.72). Additionally, the table demonstrated that there was a significant difference

between high internet users (4.03), moderate internet users (3.43), and low internet users (2.99) ($p=0.01$).

Additionally, a significant difference ($p=0.01$) was noted between moderate and low internet users. According to the post hoc analysis, senior secondary students' psychological health was more negatively impacted by the internet when their mothers were well educated, lived in joint families, and used the internet frequently to moderately. The reason might be that because parents are preoccupied with work and family obligations, they are not keeping as close an eye on their kids' online habits. This may influence how much time teenagers spend online, which could have an impact on their mental health.

Similarly, to the present finding (Maheshwari and Preksha 2018) ^[10] also mentioned the role of parent's education, experience of using internet and frequency of using social networking sites in internet addiction among teenagers.

Table 6: T-ratio Showing Differences in Impact of Internet on Psychological Health of Senior Secondary Students (N=400)

| Variable | Categories | N | Mean | SD | Df | t | Sig. (2-tailed) |
|-----------------|------------|-----|------|------|-----|---------|-----------------|
| Gender | Male | 200 | 3.46 | 0.65 | 398 | 3.4813 | 0.01 |
| | Female | 200 | 3.19 | 0.54 | | | |
| Class | Xith | 168 | 3.28 | 0.61 | 398 | -0.9665 | 0.1672 |
| | XIIth | 232 | 3.35 | 0.61 | | | |
| Place of Living | Urban | 200 | 3.38 | 0.67 | 398 | 1.48263 | 0.06948 |
| | Rural | 200 | 3.26 | 0.55 | | | |

$p<0.01$

Table 6 indicates the t-ratio calculations for the differences in the impact of internet on psychological health among the senior secondary students. It showed that there were no significant differences found in the impact of internet on psychological health among the selected students in relation with their gender, class and place of living. Thus, it can be said that the impact of internet was similar irrespective of their class, gender, and place of living.

Suggestions

- Encourage digital literacy and moderate use --Teens should be taught healthy limits for screen time and give awareness about quality vs. quantity of online content--prioritise informative and productive platforms.
- Teachers and parents should promote teenagers' participation in extracurricular activities, such as sports, hobbies, and group activities, that reduce dependence on social media. They should also ensure that adolescents have a friend circle and support networks to lessen feelings of isolation.
- Adolescents should be provided with awareness skills to manage cybercrime, cyberbullying, peer pressure, and negative feedback on social media.
- Mental health awareness & counseling--School should have counselors or mental health professionals for early intervention and should launch campaigns or communities to normalise talking about depression, stress, and anxiety linked daily life.

Conclusion

The present finding discover that the internet had high to moderate impact on their psychological health. The students, on the one hand, agreed that internet helps in increasing their confidence level and on the other hand it also controls their mood to some extent. It indicates that internet had an impact in both positive and negative manner on their psychological

health. The role of peers was also found to be related with their use of social media. The peer pressure makes a compulsion feeling among the adolescents to use the internet and social media. The highest index was observed for the communication skills got better after using internet (4.01). This indicates the positive impact of internet. Further, high impact was noticed for the importance of having internet during pandemic (4.00) and relaxing feeling after using internet for entertainment purposes (3.89). These findings highlight the need of internet during pandemic and its role in entertainment of individuals. A significant difference has been observed in the impact of internet on the psychological health of the respondents in relation with their mother's education, type of family, number of family members and also their internet usage. However, there was no significant difference observed in relation with their age, stream of study, father's education, parent's occupation and number of siblings.

Overall, the findings of the study show that, despite its positive effects on communication and relaxation, the internet's influence on mood and social behavior requires moderation and responsibility. In order to assist adolescents in maintaining a healthy relationship with technology, educational institutions and parents should promote digital literacy as well as awareness of mental health issues.

References

1. Bhosale S, *et al.* Study of psychological problems among adolescent students in Pune. J Al Ameen Med Sci. 2015;8(2):150-5. ISSN: 0974-1143.
2. Cabrera AG, Andal Bernard A, Delariarte CF, Kallarackal MV, Tanganco GJS. Fear of missing out and social networking site usage: Predictors of problematic internet use among college students. Asia Pac J Acad Res Soc Sci. 2019;4:56-61. Available from: <https://www.researchgate.net/publication/340331319>

3. Dean B. How many people use social media in 2021? \[Internet]. 2021 \[cited 2021 Jul 4]. Available from: [\[https://backlinko.com/social-media-users\]](https://backlinko.com/social-media-users)(<https://backlinko.com/social-media-users>)
4. Feng Y, Ma Y, Zhong Q. The relationship between adolescents' stress and internet addiction: a mediated-moderation model. *Front Psychol*. 2019;10: Article 2248.
5. Güzel N, *et al*. Internet addiction and its impact on physical health. *Turk Med Stud J*. 2018;5:32-36. doi:10.4274/tmsj.2018.05.03.0002
6. Jackson L, von Eye A, Biocca F. Children and internet use: Social, psychological and academic consequences for low-income children. 2006;1-6.
7. Jahoda M. The meaning of psychological health. *Soc Casework*. 1953;34:349-354. Available from: [\[https://psycnet.apa.org/record/1954-04293-001\]](https://psycnet.apa.org/record/1954-04293-001)(<https://psycnet.apa.org/record/1954-04293-001>)
8. Jackson L, von Eye A, Biocca F. Children and internet use: Social, psychological and academic consequences for low-income children. 2006;1-6.
9. Lakshmana KS, Rehmatulla M. Internet use among adolescents: Risk-taking behavior, parental supervision, and implications for safety. *Indian J Soc Psychiatry* \[Internet]. 2017 \[cited 2021 Jul 17];33(4):297-304. Available from: [\[https://www.indjsp.org/article.asp?issn=09719962;year=2017;volume=33;issue=4;spage=297;epage=304;aulast=Lakshmana\]](https://www.indjsp.org/article.asp?issn=09719962;year=2017;volume=33;issue=4;spage=297;epage=304;aulast=Lakshmana)(<https://www.indjsp.org/article.asp?issn=09719962;year=2017;volume=33;issue=4;spage=297;epage=304;aulast=Lakshmana>)
10. Maheshwari SK, Sharma P. Internet addiction: A growing concern in India. *Indian J Psychiatr Nurs*. 2018;15(1):61.
11. Romano M, Osborne LA, Truzoli R, Reed P. Differential psychological impact of internet exposure on internet addicts. *PLoS One*. 2013;8(2):e55162. Available from: [\[http://dx.doi.org/10.1371/journal.pone.0055162\]](http://dx.doi.org/10.1371/journal.pone.0055162)(<http://dx.doi.org/10.1371/journal.pone.0055162>)
12. Singh J. Impact of social media on Indian youth with special reference to COVID-19. *Int J Innov Technol Explor Eng (IJITEE)*. 2020;9(9):493-496. doi:10.35940/ijitee.I7627.079920
13. Singh N, Barmola KC. Internet addiction, mental health and academic performance of school students/adolescents. *Int J Indian Psychol*. 2015;2(3):205.
14. Singh V. Impact of social media on social life of teenagers in India: a case study. *J Acad Perspect Soc Stud*. 2019;1:13-24.
15. Tripathi A. Impact of internet addiction on mental health: An integrative therapy is needed. *Integr Med Int*. 2017;4:215-22. doi:10.1159/000491997. Available from: [\[https://www.karger.com/Article/FullText/491997\]](https://www.karger.com/Article/FullText/491997)(<https://www.karger.com/Article/FullText/491997>)