CHAPTER 5
DISCUSSION AND SUMMARY
CHAPTER 5

DISCUSSION AND SUMMARY

HYPOTHESES RELATED DISCUSSION

Hypothesis 1: Adolescents with mild, moderate & severe Internet addiction differ significantly in their Visuo-motor coordination and Psychomotor speed is formulated to know the effects of varied levels of Internet addiction on Visuo-motor coordination and Psychomotor speed. The hypothesis was tested using one way ANOVA and the obtained F value clearly indicated Hypothesis 1 is accepted, thus internet addiction had a significant effect on psychomotor speed and visuo-motor coordination. Further it was also observed that the Mild internet addicts had better psychomotor speed and visuo-motor coordination compared to moderate internet addicts group. The sample of severe internet addicts group had exhibited low psychomotor speed and visuo-motor coordination compared to other 2 groups.

The findings of the study revealed that there is a significant impact of internet use on psychomotor skills and visuo motor coordination, through this findings we can infer that severe use of internet or internet addiction hampers cognition and cognitive development of young adolescents the studies are indirectly asserted by Aviv Weinstein and Michel Lejoyeux (2013), Yuan et al. (2011), (Kalivas and Volkow, 2005)

Choi et al., (2014) in his study using traditional neuropsychological tests including the Stroop and computerized neuropsychological tests revealed that people with internet addiction disorder exhibited more impulsive traits that non addicts, further it was also observed that people with Internet addiction performed more
poorly in a computerized stop signal test. Parsons (1998) studies identified that like alcohol addicts, internet addicts also show showed certain withdrawal symptoms such as neuro cognitive problems such as deficits in memory, learning, visuo-spatial functions, psychomotor speed processing, executive functions and decision-making, and the cognitive alterations.

The development of the adolescents psychomotor functioning is necessary for fostering creativity, it facilitates the learner’s practices and also motivate the learner to try different alternatives. Many of the research studies have confirmed that using multiple representations, including virtual demonstrations, are beneficial in preparing students for actual live performances of psychomotor skills. As new media are becoming daily fare, Internet addiction appears as a potential problem in adolescents in focusing their attention completely towards hardcore practice.

**H2 - Adolescents with mild, moderate & severe Internet addiction differ significantly in their Attention** is formulated to know the effects of varied levels of Internet addiction on attention. The hypothesis was tested using one way ANOVA and the obtained F value clearly indicated Hypothesis 2 is accepted, thus Internet addiction had a significant effect on attention. Further it was also observed that the Mild Internet addicts had better attention and concentration compared to moderate Internet addicts group. The sample of severe internet addicts group had exhibited low attention and concentration compared to other 2 groups. Literature review showed that excessive internet use may have a serious impact on the structure and functional part of the brain which directly affects the cognition of a person. (Sepede G, Tavino M, et al., (2016), Since attention and concentration is said to be one of the key component
of the cognition no doubt excessive use of Internet will adversely affects attention and concentration (Weinstein, Livny, Weizman 2017). Since attention is an important cognitive component and any form of deficit in attention will hamper a person’s information processing which further will have its consequence on many aspects of cognition such as decision making, problem solving, learning, memorising etc. Manfred Spitzer (2013) book on digital dementia indicated that constant connection and overuse of technology lead to lateralization of brain functioning, thus these imbalance in brain functioning may damage the other part of the brain which results in deficits in ability to concentrate, short attention, memory span.

Kep Kee Loh and Ryota Kanai (2014) study in the University of Sussex indicated that prolong exposure to new experience and new environment eg upcoming new internet applications alter structure of the brain which is confirmed through MRI studies proving that excessive media-multitasking decreases the gray matter in the brain resulting in poor cognitive performance such as poor attention and concentration, Which supports our present findings.

H3 - Adolescents with mild, moderate & severe Internet addiction differ significantly in their auditory memory span this hypothesis was designed to know impact of internet addiction on another cognitive ability thus auditory memory. To test the hypothesis one way ANOVA was use and the obtained F ration indicated that Hypothesis 3 is accepted, thus internet addiction had a significant effect on auditory memory. Further it was also observed that the mild Internet addicts had good auditory memory compared to moderate Internet addicts group. The sample of Severe internet addicts group had exhibited poor auditory memory compared to other 2 groups. Thus it is statistically proved that excessive use of internet has a serious impact on the cognitive functioning.
German neuroscientist Manfred Spitzer (2012) in his article ‘Digital Dementia’ explained that overuse of digital technology results in breakdown of cognitive abilities in a way that is more commonly seen in people who have suffered a head injury or psychiatric illness. He further explains that excessive use of internet may deteriorate the performance of cerebral part of the brain which hampers short term memory.

Spitzer (2013) study further suggested that people who heavily rely on digital technology may have the problems associated with deterioration in cerebral performance which causes short term memory dysfunction. Excess use of smart phones and game devices hampers the balanced development of the brain leading to cognitive impairment.

Use of smart phone has reduced the human efforts of memorizing phone numbers, birthday dates and other relevant information, which is easily done by the Smartphone, but in actual reality the brains neuronal activities related to these functioning getting deteriorated and the long term consequence of having poor working as well short term memory. Further the study also suggested that imbalance in brain functioning caused due to excess use of internet may damage cognitive functioning such as attention concentration and memory. The resent study in Xidian University, China reported that internet used for a longer duration results in structural alteration in the brain, which leads to chronic cognitive dysfunctions. (Kai Yuan, Wei Qin, Guihong Wang, Fang Zeng, Liyan Zhao, Xuejuan Yang, Peng Liu, Jixin Liu, Jinbo Sun, Karen M. von Deneen, Qiyong Gong, Yijun Liu 2011)
Sparrow (2011) study on memory of college students using internet found an interesting pattern. The study showed that those who use internet excessively could not recall information by themselves, whereas they could easily and accurately recall where to find that information online.

**H4 - There will be a significant interaction effects between levels of Internet addiction and developmental span on visuo-motor coordination, psychomotor speed, attention and auditory memory** this hypothesis was formulated to know influence of developmental span and levels of internet addiction on visuo-motor coordination, psychomotor speed, attention and auditory memory span. The F ratio on interaction between developmental span and levels of internet addiction indicated that there is a significant interaction between effects on visuo motor coordination and psycho motor speed but there is no significant interaction effect was found between levels of Internet addiction and developmental span on attention and auditory memory span. It was further observed that developmental span as such as no influence on levels of internet addiction and on all the dependent variables but levels of internet addiction had a significant influence on visuo-motor coordination, psychomotor speed, attention and auditory memory span among the adolescents.

Since the adolescent period is considered to be the most vulnerable period for internet addiction among all the other age group, it is the adolescent group who are highly susceptible to negative consequences of internet addiction. Studies indicated that excessive internet use among adolescents is associated with work negligence, poor academic and social responsibilities, poor interpersonal and intrapersonal
relationships, decrease in psychosocial wellbeing (Young, 1998a; Weiser, 2001; Beard, 2002; Widyanto & Griffith, 2006).

In the present research the development span of early and late adolescent group were compared and it was observed that there was no significant differences in developmental span on internet addiction for all the variables except for visuomotor coordination and psychomotor speed, these could be probably because even a young child of 5 to 6 years of age can easily operate the smart phones and download their favorite games. The easy accessibility of smart phones and internet at lower cost and also the availability of computer with internet in almost all the families of Bengaluru city providing the opportunity to learn the internet applications at very tender age. This could be the probable reason why there is no significant difference among early and late adolescent in their internet use.

**H5 - There will be a significant interaction effects between levels of Internet addiction and Gender on visuo-motor coordination, psychomotor speed, attention and auditory memory span** this hypothesis was formulated to know influence of gender and levels of internet addiction on visuo-motor coordination, psychomotor speed, attention and auditory memory span. The F ratio on interaction between gender and levels of internet addiction indicated that there is a significant interaction between effects on visuo motor coordination and psycho motor speed attention for backward recitation of digits and auditory memory span for both forward and backward recitation of digits, but there is no significant interaction effect was found for attention forward recitation of digits. It was further observed that gender had a significant influence on levels of internet addiction and on all the dependent variables except for auditory memory backward recitation of digits and levels of
internet addiction also had a significant influence on visuo-motor coordination, psychomotor speed, attention and auditory memory span among the adolescents.

The present study indicated that there is a gender difference existed among the internet users, the same is also been proven by other related studies Kim (2011) study indicated that adolescent boys and girls differed in the ways that they used the Internet. Girls were more likely to use the Internet to watch online education classes and blog more frequently and longer than boys, whereas boys were more likely to use the Internet for playing internet games than girls. Ko et al. (2008) findings indicated that there is a significant gender difference on the association between Internet addiction and frustration intolerance. The male adolescents with internet addiction had higher intolerance to frustration of entitlement and emotional discomfort, and female adolescents with it had higher intolerance to emotional discomfort and lower tolerance to frustration of achievement.

Forrester and Geffen (1991) found no gender differences on an auditory learning task for 40 girls and 40 boys between the ages of 7 and 15. However certain studies proved that men are male students are better in forward recitation of digits and female adolescents are better in backward recitation of digits theses is because of forward digit span measures working memory, whereas backward recitation measures attention and concentration (Hyo Jung Choi, Dong Young Lee and Jong Inn Woo, 2015)
Another study by Sao Paulo (2013) showed that female children showed better performance in verbal memory and male children were better in visual span, indicating female are better in auditory memory specially forward recitation of digits which involves more attention and concentration.

Studies pertaining to psychomotor speed and visuo motor coordination indicates that male are better in psychomotor speed and visuomotor coordination. The findings are supported by Russell, Katkowski, Le, and Rosse (2005) Caretta (1997) study also proved that men are better in psychomotor functioning compared to female.

Main findings of the study

- Internet addiction had a severe impact on visuo motor coordination and psycho motor speed among adolescents.
- Adolescents belonged to mild internet addiction group were better in psychomotor speed and visuo motor coordination compared to other groups.
  1. Internet addiction had a severe impact on attention both for backward and forward recitation of digits.
  2. Adolescents with mild internet addiction had better level of attention and concentration compared to other groups.
  3. Internet addiction had a severe effect on auditory memory for both backward and forward recitation of digits.
  4. Adolescents with mild internet addiction were good in their auditory memory compared to other groups.
  5. Levels of internet addiction and developmental span had a significant influence on visuo motor coordination.
6. Levels of internet addiction and developmental span had no significant influence on Attention for both forward and backward recitation of digits.

7. Levels of internet addiction and developmental span had no significant influence on auditory memory for both forward and backward recitation of digits.

8. Levels of internet addiction and gender had a significant influence on visuo motor coordination.

9. Levels of internet addiction and gender had no significant influence on Attention forward recitation of digits but there was a significant influence on backward recitation of digits.

10. Levels of internet addiction and gender had a significant influence on auditory memory for both forward and backward recitation of digits.

11. Developmental span as such had no significant influence on visuo motor coordination, psychomotor speed, attention for both forward and backward recitation of digits and auditory memory for both forward and backward recitation of digits.

12. Gender wise comparison revealed that there is a significant gender difference was found, male adolescents were better in visuo motor coordination, psychomotor speed, attention for forward recitation of digits and auditory memory forward recitation of digits. Female adolescents were found to be good at attention backward recitation of digits and auditory memory backward recitation of digits.
Implication of the study

Internet use has become an important arena of Human life. They are the source of information, helps in providing anything and everything on the finger tip. They are stage for advertisement, entertainment program and a speed way of delivering the information letters and emails worldwide. With the help of internet especially social network sites one can share their personal details, photos, videos, blogs and so on. Though technology is created to ease our day to day life unfortunately its human tendency to use it in wrong manner and addicted to it which has its own impact in different ways. Internet addiction, as a form of technological addiction (Griffiths, 2001) ruins lives by causing neurological complications, psychological disturbances, and relational chaos (Hur, 2006).

- The present study marks a quick need of psycho-social intervention program to help adolescents with internet addiction.
- NGO’s educational department must take the initiative in providing the awareness program for the young budding adults regarding the productive use of Technology especially Internet for academic purpose
- The present study throws the light on Role of teachers and parents in monitoring and guiding the adolescent’s use of Internet.
- The present study throws the light on the role of community mental health workers, psychologist and social workers in developing the intervention programs to battle the Internet addictive behaviour among the adolescents.
- The present study also suggest the parents to provide their precious time with their adolescents by guiding, monitoring and providing emotional and moral support so that adolescents will not divert themselves towards the wrong channel.
Limitations of the study

- The major limitation of the present research is that the use of self rating technique to screen out Internet addiction. There is a chance of few individuals overrate themselves, few underrate themselves and few rate themselves accurately (Bradberry and Graves, 2003).

- To have an in depth analysis of certain variables qualitative measures would have been incorporated.

- The sample incorporated for the present study was very limited for generalization.

- The present study was conducted on urban adolescents, which cannot be generalized for rural population as well to adult population.

Recommendations for further research

- Further research is needed in terms of longitudinal study, to have a better understanding of internet addiction and its adverse effect on the cognitive functioning.

- The study could be further extended to other cognitive functioning such as learning, memorizing, levels of understanding the information, analysing and interpretation of information and so on.

- Research is also need in understanding the effect of internet addiction among the employee group on their career.

- Studies related to intervention models to combat the adverse effects of internet addiction can be undertaken.
Summary

Due to the impact of globalization and the rapid expansion and development of the internet has supplied a greater opportunity for social networking, seeking information, creating blogs and tweeting so that societies attention can be drawn, towards them. Internet is used for wide range of purposes, few use it for research purpose, for academic purpose, creative idea generation, interpersonal communication, while others use it for extreme online gaming, chatting in social network site, viewing porn videos, gambling etc. The progress of Social network site users hiked the Mobile industries and Tele communication Industries which marked a great contribution to economic development. This revolution has led to both positive as well negative impacts on the internet users.

The present study was initiated to investigate Internet addiction and its effect on select psychomotor functions among adolescents dwelling in Bangalore city. It was hypothesised that there will be significant effect of varied levels of internet addiction on visuo motor coordination, psychomotor speed, attention and auditory memory, as well there will be a significant interaction effects between levels of Internet addiction and developmental span on visuo-motor coordination, psychomotor speed and attention and auditory memory span and significant interaction effects between levels of Internet addiction and Gender on visuo-motor coordination, psychomotor speed and attention and auditory memory span.

For the present study survey method was used, the study was conducted on various school and college students of Bengaluru city. Nearly 650 School and College students aged between 12 to 18 years who are willing to participate in the research were asked to fill in the socio-demographic details wherein information pertaining to
age, class, scholastic details, socio economic details of parents, order of birth and other relevant details were extracted after which Dr. Kimberly Young’s internet addiction test was administered to know about their levels of internet addiction followed by psychomotor ability test a sub test of David battery of differential aptitude test was administered to assess the visuo motor coordination and psychomotor speed, attention and concentration test a sub test of PGI memory scale was administered to measure the attention of the subject, This test consists of two sections: digit forward and digit backward and digit span forward and digit span backward test a subtest of Wechsler adults intelligence scale revised was administered to assess the auditory memory of the subjects, this test again consists of two sections: Digit forward and Digit backward. All participants received the same descriptions of the study and were told that all responses provided would be kept both confidential and anonymous. Data collection was done in four sessions and each session lasted for about 15-40 minutes.

Among 650 participants 160 participants were found with mild internet addiction, 210 participants were found with moderate internet addiction and lastly 280 participants were found with severe internet addiction. Random sampling technique was used and 30 male and 30 female mild internet addicts between the age group of 12 to 15 years were selected, 30 male and 30 female moderate internet addicts between the age group of 12 to 15 years were selected, 30 male and 30 female severe internet addicts between the age group of 12 to 15 years were selected for the present study. Similar way 30 male and 30 female mild internet addicts between the age group of 16 to 18 years were selected, 30 male and 30 female moderate internet addicts between the age group of 16 to 18 years were selected, 30 male and 30 female severe internet addicts between the age group of 16 to 18 years were selected.
severe internet addicts between the age group of 16 to 18 years were selected for the present study. The total of 360 samples was selected for the present study.

To achieve the objectives of the present study the data was analysed by computing one way ANOVA, Post-hoc test and two way ANOVA statistics.

The obtained F value on Visuo motor coordination and psychomotor speed indicated that there is a significant mean difference on Visuo motor coordination and psychomotor speed among the sample group belonging to mild Internet addicts, moderate internet addicts and severe internet addict groups. Mild Internet addict groups had exhibited greater mean score on visuo motor coordination and psychomotor speed compared to moderate Internet addict group and severe internet addict group has obtained lesser mean score compared to mild and moderate group. Through above results we can infer that students with severe internet addiction had exhibited poor psychomotor speed and visuo motor coordination that compared to moderate and mild Internet users. The above findings mark a clear evidence of impact of internet addiction on psychomotor speed and visuo motor coordination.

The obtained F value on Attention for both backward and forward recitation of digits indicated that there is a significant mean difference on Attention for both backward and forward recitation of digits among the sample group belonging to mild Internet addicts, moderate internet addicts and severe internet addict groups. Mild Internet addict groups had exhibited greater mean score on Attention for both backward and forward recitation of digits compared to moderate Internet addict group and severe internet addict group has obtained lesser mean score compared to mild and moderate group. Through above results we can infer that students with mild internet addiction were better in their attention and concentration and severe internet addiction
group had exhibited poor attention and concentration that compared to moderate and mild Internet users. The above findings clearly indicate that internet addiction has a serious impact on attention and concentration among the adolescents.

The obtained F on Auditory memory for both backward and forward recitation of digits value indicated that there is a significant mean difference on auditory memory digit span for both backward and forward recitation of digits among the sample group belonging to mild Internet addicts, moderate internet addicts and severe internet addict groups. Mild Internet addict groups had exhibited greater mean score on auditory memory for both backward and forward recitation of digits compared to moderate internet addict group. The severe internet addict group has obtained lesser mean score compared to mild and moderate group. Through above results we can infer that students with mild internet addiction were better in their auditory memory and sever internet addiction group had poor auditory memory that compared to moderate and mild Internet users. The above findings clearly indicate that internet addiction has a serious impact on auditory memory among the adolescents.

The two ANOVA results in Hypothesis 4 indicated that there is a significant interaction between effects between levels of Internet addiction and developmental span on visuo motor coordination and psycho motor speed but there is no significant interaction effect between levels of Internet addiction and developmental span on attention and auditory memory span. It was further observed that developmental span has no influence on levels of internet addiction on all the dependent variables.
The two ANOVA results in Hypothesis 5 indicated that there is a significant interaction between effects between levels of Internet addiction and gender on visuo motor coordination and psycho motor speed attention forward recitation of digits and auditory memory span for both forward and backward recitation of digits but no significant interaction effect was found on the variable attention backward. It was further observed that gender had a significant influence on levels of internet addiction on all the dependent variables such as visuo motor coordination and psycho motor speed attention forward and backward recitation of digits and auditory memory span for forward recitation of digits but no influence was observed on backward recitation of digits.

The finding of the present study affords an insight in relation to the effects of internet addiction among the adolescents. Through present study it was noted that excess use of internet has a negative impact on the selected psychomotor functioning indicating how the cognitive functioning of a young budding adults are hampered. Internet addiction potentially troubles the structural and functional part of the brain including the imbalance in brain neuro-chemical process, which has a serious impact on the cognitive functioning.

Psychomotor speed and visuo-motor coordination, attention and auditory memory are considered to be a very important cognitive task which plays an important role in human intelligence both practically as well as academically, disturbance in these areas may create a great loss to the upcoming young adults and their contribution towards society. Without their knowledge of the serious impact of internet addiction adolescents are getting engrossed to internet and within no time they develop an addictive behaviour that hinders psycho social and physiological life.
Internet addiction has been found to lead to serious impairment in psychological and social functioning (Young, 1996) as well as cause increased feelings of loneliness overtime (Yao & Zhong, 2014).

The above finding expresses a greater need of implication towards the development of psycho-social intervention program to help adolescent to triumph over the addictive behaviour that they have developed due to high Internet usage. The study also throws light on role of teachers and parents in monitoring the adolescents and guiding the young adolescents to make a proper use of Internet for the purpose of healthy academic discussions, viewing and sharing educational valued videos and audios, group discussions etc which help them in improving their scholastic achievement as well nurtures a healthy interpersonal relationship with their friends.

Further the present research also indicates the implication of role of social workers, community mental health professionals, educationalists, psychologist, parents and teachers for helping the young budding adult to combat the adverse effect of Internet addiction and help them by creating an awareness program regarding the proper and healthier way of using internet rather than using it in a wrong way.
CONCLUSIONS

The present study has attempted to throw light on identifying the effects of varied levels of internet addiction on various selected psychomotor functioning through which draw the inferences for the cognitive functioning and to find out the influence of gender and developmental span and internet addiction on selected psychomotor functioning. It was focused to identify the difference among the varied levels of internet addiction on the selected psychomotor functioning. It was observed that severe internet addiction had a severe impact on all the selected psycho motor functioning through which we can indirectly assert that internet addiction has an impact on cognitive development of the adolescents. The demographic variables such as gender also have an influence on internet addictive behaviour but developmental span as such has no influence on internet addiction. It was observed that some of the studies in this field indirectly assert the present findings and present finding alerts the need of psychologist, educationalist, community mental health professionals and social workers to work towards intervention program to help internet addict adolescents with internet addiction.