Prevention of Health Hazards Related to Usage of Electronic Devices among Preparatory School Students

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Abstract

Background: Preparatory School Students are a vulnerable group; they may be prone to high pattern of electronic devices usage which leads to negative effects on their health. So, the prevention of health hazards related to Usage of electronic devices is particularly important. **Aim:** The study aimed to evaluate effect of Prevention program of health hazards related to usage of electronic devices among preparatory school students. **Study design:** A quasi-experimental design was used to conduct this study. **Subject:** Multistage sample composed of eight hundred preparatory school students. **Setting:** This study was conducted at 19 governmental preparatory schools at El Sharabeya, and El-Zawia El- Hamra administrations for male and female students. **Tools:** It is composed of two-tools. The first tool is a self-administered questionnaire to assess socio-demographic characteristics, pattern of internet use, social and psychological health condition of students. The second tool is a physical assessment to assess their physical health status. **Results**: The result of this study showed that 33.5% of preparatory school students were aged 13 years old, 69% was males. 10.5% of students spent more than eight hours online and 79% of them use internet through mobiles or tablets, 28% of students' body weight increased, 46.5% of their sleeping pattern affected because of electronic devices, and 53% of them suffered from neck and backache after browsing the internet. **Conclusion:** The study concluded that there was statistically significant efficacy of the prevention program on improving the health pattern for school children and their knowledge about prevention of health hazards related to usage of electronic devices. As well, the program had significant effect on decreasing the negative effect of physical, social, and psychological health hazards, in addition to enhancing scholastic achievement through program implementation phases with significant statistical difference (P<.0001). (P<.0001). **Recommendation**: The study recommended that periodical health education about prevention of health hazards related to usage of electronic devices is necessary to raise school children's awareness and improve their health status and scholastic achievement.

Keywords: Health Hazards, Electronic Devices, prevention program, preparatory school

I. Introduction

Electronic devices or gadgets are "an application of knowledge to the practical goals of human life or to modifying and influencing the human environment," according to one definition. A device that uses electricity to improve productivity and make life easier or more enjoyable is known as an electronic device. **(Gentile, et al., 2014).**

Students' lives today are largely reliant on electronic devices. Every day, the use of technological devices rises in popularity. Numerous studies have looked at how much time students spend on various gadgets such the phone, TV, games, iPod, computer, and tablet. Electronic gadgets are used by students for a variety of activities including studying, playing games, watching videos, listening to music, communicating with friends, and surfing other websites. The majority of their time is spent engaging in these activities, and they neglect factors like body posture during usage, screen brightness, and screen distance from their eyes that might harm their eyesight and general health. **(Jonathan, Andrew, 2016).**

Researchers have documented negative effects and health hazards of electronic devices related to improper usage of these devices which effect on student's physical health, such as obesity, video-induced seizures, and musculoskeletal disorders due to poor posture, such as tendinitis, nerve compression, and carpal tunnel syndrome, in addition to a delay in academic success as a result of poor time management. **(Brad and Rowell, 2015).**

The effects of computers on a student's social well-being are less well understood, despite the fact that computers are changing the dynamics of human interaction and relationships. Despite the fact that electronic devices and online applications have made it possible for people to stay connected in distant places and have made the world into a global village. According to researchers, social media, and more specifically the internet, fosters community building by bringing together people who have similar interests. However, other studies contend that social isolation may happen as a result of decreased face-to-face interaction and absence of touch with others during routine everyday activities **(Hosale, 2013& Green, 2015, Kupfer, 2016).**

All school health nurses must be able to identify cases of student abuse and take appropriate, role-appropriate action in order to safeguard students from harm. They should also be supported by their employer and have a clear understanding of their obligations. **(Jean and Elishabeth, 2014).**

The community health nurse identifies the reason for electronic devices usage, makes continuing instructions on the pattern and sees if students hold their phones continuously at school. In addition to asking parents to limit the time spent on computers and Smartphone's or limiting buying these devices **(Wieland, 2014).**

In order to prevent electronic devices usage hazards, the school nurse should advise school students never to use tablets, mobiles, or laptops during chargers **(Sanders, 2015).** Avoid listening to loud music or headphones for a long time as this can damage the hearing **(CDC, 2016).** In addition to, providing health education about proper body mechanics when using the electronic devices and performing the ergonomic exercises in case of hazards found **(Peper, 2017 & OSHA, 2017)** Also it is important to dispose of electronic devices waste properly **(DeVroom, 2019).** Finally, should follow a healthy diet and avoid junk foods especially during usage of electronic devices to maintain body weight **(Liora, 2015).** Get of physical activity every day as walking, running, bicycling, dancing, swimming, playing sports, and jumping rope. National heart **(National heart, Lung, and blood institute, 2017).** Turn off televisions, computers, radios, and other stimulating activities at bedtime because it causes problems in falling asleep **(The national sleep foundation, 2014)**.

1. 1. Significance of the Study:

Internet usage in Egypt is growing, with over 47.4 million users in 2018 compared to 40.9% in 2016, according to data on electronic device usage. Adolescents make up more than 80% of the top internet café patrons in Egypt. Many individuals, especially teenagers, are struggling with the growing prevalence of computer technology and the internet, whose excessive use leads to mental and psychological diseases. With a sharp rise in internet usage among teenagers everywhere, there is widespread concern that they are at significant risk. global growth in their use of the internet ***(Statista, 2018).***

1. 2. Aim of the study:

The study aimed to evaluate the effect of prevention program of health hazards related to usage of electronic devices among preparatory school students.

1.3. Research hypothesis:

The prevention program will improve preparatory school students' knowledge about health hazards related to usage of electronic devices and their pattern of usage which led to promote their health status and ameliorate scholastic achievement.

II. Subjects and Methods

2.1. Research design: A quasi-experimental design was used to conduct this study to evaluate the prevention program of health hazards related to usage of electronic devices among preparatory school students.

2.2. Setting: This study conducted in El Sharabeya, and El-Zawia El- Hamra educational administrations which were chosen because they contained the largest number of preparatory schools for boys and girls out of the seven administrations affiliated to the directorate of education in the north Cairo, the study conducted in nine schools belonging to the El-

Sharabeya administration and ten schools belonging to the El-Zawia administration.

2.3. Subject:

A simple random sample was used to conduct this study. The total sample consisted of preparatory school students' males and females randomly selected from three grades from different nineteen governmental preparatory schools which representing 10% of the total number of preparatory school students in the in the same academic year (eight thousand) students which equal eight hundred.

Sample technique: The researchers applied the simple random sampling method through the following stages: Firstly a sampling frame was constructed as list of all students was prepared and each student was marked with a specific number from 1 to 8000 then 800 students were selected out of total number of students by using the Random Number Generation (RNG) computer program to pick a sample which is more preferable in selection of the random samples to minimize the researchers bias in this way.

2.4. Tools of Study: The following two tools were employed to gather the data:

First tool: **Self-administered questionnaire** was created after looking over pertinent literature. It was written by the researchers in straightforward Arabic. Three sections made up the questionnaire:

Part I: To assess socio-demographic data for students. It is composed of seven closed ended questions about (age, gender, birth order, family size, crowding index, pocket money, and family type).

Scoring system of the housing crowding index:

Formula adapted from ***American Association of public opinion research, (2007)***: Number of people in a home divided by the number of sleeping rooms gives the crowding index, as seen below: Not crowded less than 1, Crowded 1: <1.5, Overcrowded 1.5 or more.

Part II: To assess students' pattern of electronic devices usage. It was adopted from **Young and Abreu (2017)**, modified by the researcher. It is composed of ten closed ended questions such as (The time, duration, frequency, and reason of electronic devices usage daily. Using electronic devices when it is low battery or during charging, the essential app used, ability to use all options of electronic devices without help, the importance of electronic devices in your life, the electronic devices and its accessories are usually used.

Scoring system of total pattern:

The scoring system as (yes) or (no) and the answered item (yes) took score (1) and answered (no) took score (0). The total score of total items were totaled and converted to percentages, which were then divided into three groups: Low pattern: < 50%, Moderate pattern: 50-75%, and High pattern: > 75%.

Part III: To assess school students' knowledge about health hazards of electronic devices usage. It composed of 15 open ended questions such as the concept of the safe use of electronic devices and its objective, the different types of electronic devices that can be used for school students, the physical, social, and psychological health hazards resulting from excessive use of electronic devices, the health hazards resulting from the waste products of electronic devices and how to dispose them, Standards of body ergonomic during excessive use of computer, laptop, and mobile or tablet, standards of the used desk, chair, keyboard, mouse, and computer screen, room light during usage, and standards of rest time and exercise.

Scoring System for knowledge:

Each correct answer was given one point score, while zero score was given to each incorrect answer. The total score was fifteen grades, for all items, which equals 100%. The school students' knowledge was considered satisfactory if the percent score was 60% or more and unsatisfactory if the score was less than 60% through program implementation.

Part IV: To assess physical, social, and psychological health hazards of electronic devices effects on students' health. It composed of twenty-nine closed ended questions such as (increasing body weight, sleep, eating, and drinking disturbances, neck pain, backache, vision impairment, arthritis, and hand cramps, fatigue and joint pain, lack of concentration, and smoking habits as

physical hazards. Also feeling shyness and refusing to attend any social events, unsociable, inactive, laziness and lack of family communication, and using the internet to create new relationships as social hazards. Regarding to psychological hazards violence and aggressive behavior, stress, and depression, and upset mode, lying, feeling of guilty, tending to isolation, defensive mode, feeling that life is dull, empty, and bleak without the smart phone, feel of agitation and screaming when bothering during usage of devices.

Scoring System for health hazards effects:

All questions scored as (Yes = 1) and (No = 0). The total scored: sum all items and the percentage was calculated then divided into two levels, low negative effect < 60% and high negative effect > 60%.

2nd tool: School Records: to assess scholastic achievement of school students by assessing the total marks during final examinations and converted into percent then categorized as the following: Excellent (≥85%), very good (≥75%), good (≥65%), pass (≥50%), and fail (<50%).

2.5. Content validity and reliability: Face validity was performed by three experts of two professors in community health nursing department and one professor from pediatric health nursing department, all of them affiliated to faculty of nursing, Ain Shams University, they reviewed the tools for content accuracy. The Cronbach alpha and Pearson correlation were used to establish the reliability test of the translated version, and they demonstrated good internal consistency and construct validity (Cronbach alpha = 0.887).

2.6. Pilot study: A pilot study conducted, involving eighty students, which represents 10% of total sample to evaluate the feasibility of the study tools in terms of its applicability, time needed to complete this questionnaire. There were no modifications were made as revealed from the pilot study result, so they included in the total sample number.

2.7. Administrative Design and Ethical Considerations: Permission for conduction of the study was obtained by submission of an official letter issued from the Faculty of Nursing, Ain Shams University to the directors of educational administrations at El-Sharabeya and El-Zawia administration to take approval for entering the school and collecting data and implement the study program. It was necessary for the researchers to get the formal consent of all students' families who agreed to their students to participate in study. So, strict confidentiality was ensured throughout the study process. The study subjects were assured that all data will be used only for research purposes. They were also informed about their right to withdraw from their study at any time without giving any reason.

2.8. Operational Design:

Field work: The study's purpose was disclosed to the students after receiving formal approval to carry it out. The study was conducted over a period of six months, lasting from the end of September 2018 to the end of May 2019, with a two-month break for the first semester's exams and the midyear vacation. The first semester's pretest and posttest took place over three months, and the second semester's follow-up took place over three months. 45 minutes on average were spent filling the tool. The researchers visited the aforementioned locations three days a week (Sundays, Mondays, and Tuesdays) from 9.00 a.m. to 12.00 p.m.

III. Nursing intervention program development phases

The four phases of this program were assessment, development, implementation, and evaluation.

Phase 1: a pre-program evaluation test that gathers information from the aforementioned settings utilizing the interview questions. This phase was designed to evaluate the knowledge and usage patterns of children in preparatory schools regarding the risks associated with using electronic devices for health purposes.

Phase 2: Developing a preventive program about health hazards of electronic devices usage.

The general objective of the program: To improve preparatory school students' knowledge about prevention health hazards related to usage of electronic devices.

The content of the preventive program is based on needs assessment of preparatory school students which include:

Specific objectives of the preventive program are:

- Identifying the concept of the safe use of electronic devices
- Enumerating the several types of electronic devices that can be used for school students
- Explaining the physical, social, and psychological health hazards resulting from excessive use of electronic devices.
- Detecting the health hazards resulting from the waste products of electronic devices and how to dispose them.
- Describing the standards of body ergonomic during excessive use of computer, laptop, and mobile or tablet.
- Explaining the standards of the used desk, chair, keyboard, mouse, computer screen, and room light during usage.
- Determining the standards of rest time and duration of electronic devices usage
- **The contents of the practical part included in the program:** It involves demonstration of the body exercise such as neck stretches, wrist stretch, seated side stretch, knee squeeze, hamstring stretch, and full torso stretch. In addition to aerobic exercise such as squats, push-ups, and some steps for fitness exercises which should be done to prevent the mentioned health hazards of poor ergonomics.

Phase 3: Implementation of the program: The aforementioned settings were used for the program's implementation. An introduction to the program and its goals was given to the students at the start of the first session. Each session began with a summary of the information presented in previous sessions and the goals of the new topics, both of which considered the use of straightforward language to meet the educational level of the students.

The theoretical portion of the programme was taught in two sessions using lectures and discussions, and was then followed by the practical portion, which was reinforced in two sessions using drama and storytelling while watching a video on various body training techniques. Each session lasted anywhere from 30 to 45 minutes. Posters, flyers, and power point presentations were used as effective informational mediums. For students to use as a reference following the program's installation, a handbook was created. Each group of 20–25 kids who made up the study sample of prep school students met in their respective courses, activity rooms, or library rooms at their respective schools. All pupils received the preventive program at the appropriate time for them based on their class schedule. They got the same program material, employed the same teaching techniques, and received direct reinforcement in the form of a copy of the intervention program booklet to make sure they were all exposed to the same learning experience.

Phase 4: Evaluation phase: The evaluation phase was done immediately post implementation of the program and follow up after three months by comparing changes in students' knowledge, pattern of electronic devices usage, and their level of scholastic achievement, in order to identify differences, similarities and areas of improvement as well as clinical defects.

Statistical Design: The "statistical package for the social science" (SPSS windows), version 20 was used to code, score, tabulate, and analyze the data. Quantitative information was presented as frequency and percentage. The frequency and proportion of the qualitative data were expressed. Chi-square (X2) was used to analyze relationships between various numerical variables, and P values of less than 0.05 and less than 0.0001 were regarded as significant and highly significant, respectively.

IV. Result:

Table (1) shows that, 28.5% of studied sample of students their age are 13years or more and 33.5% of them aged 14 years or more and 69.9% of them are male while, 30.1% are female, and 51.5% of them are ranked as the third child or more. As regards home-crowding index, 38.8% of the students lived in overcrowded homes and 61% of them did not have enough pocket money and 80.9% of them were nuclear families.

Table (2) regarding the pattern of electronic devices usage, there were 50.5% of students using the electronic devices from 5 to 8 hours daily and 34% of them used those devices for more than 8 hours were used at any time for 71% of students and 45% used it frequently for more than three times daily which led to that, 45.3% of students usually used it when it is low battery or during charging. There were 65% of students used of social media as essential app for chatting such as face book, twitter, and WhatsApp. Also 79% of students usually used smart phone or tab where 73.5% of them were excellent in using all its applications without help while 75.1% of them used headphones.

Fig (1) Related to the total pattern of electronic devices usage, there were 84.6% of school students used of electronic devices with highly pattern preprogram implementation but this was improved to low pattern as an efficient effect of this program to become 12.9% of them after conducting the program and 42.3% of them during follow-up the program with highly statistically significant difference X2= 852.29, P. value= < 0.001.

Fig (2) illustrates that, there were 67.6% of school students had unsatisfactory knowledge toward prevention of health hazards of electronic devices pre prevention program implementation and was improved to satisfactory level as an efficient effect of this program to become 82.9% of them after conducting the program and 87.6% of them during follow-up the program with highly statistically significant difference X2= 89.86 P. value= < 0.001.

Table (3) demonstrates that, 28% of students suffered from overweight, 46.5% of them complained of sleep pattern disturbance, 41% of the students reported that, they have disturbance in eating and drinking pattern to be unhealthy and 43% of them and 53% suffered from neck pain and backache respectively also 56% for fatigue and joint pain. In addition to that, 28.5 % of students complain of vision impairment also 27% of them smoked during computer usage.

Also, the table presents that, 50.6% of studied students considered the social media their own world and all society surrounded, 35.1% of them felt of shyness and refused to be attending social events, 52.8% of them were unsociable and had lack of family dialogue, and 69% of students felt of laziness most time. Also, the table shows that 73.5% of students were inactive and socially isolated while 70% of them used the internet to create new relationships.

Regarding the psychological health hazards, there were 47.5% of them felt with increasing violence and aggression attitude, 51% of them felt of stress and depression, 70% of them felt guilty feeling if the internet was used for longer than necessary, and 58.5% of them tended to be isolated, which made it difficult to communicate with those around them. Also, 50.1% of them felt that their life is dull, empty, and bleak without their own smart phone.

Table (4) presents that, there are noticed improvement of physical health hazards effect through prevention program implementation process which represent 83% of students were affected highly negative preprogram but after implementation became 20% and at follow-up it became 21%. In addition to changed positively in social and psychological health hazards effect of electronic devices on students' health through program implementation with highly statistically significant differences with p value <0.001.

Table (5) as regard the students' scholastic achievement effect through program implementation process, there was noticed ameliorate in scholastic achievement after prevention program implementation as there were 15.2% of students had excellent grads during conducting the follow-up of program compared with 8.6% of them before program implementation and there were 20% of students failed before program implementation and decreased to 17.1% post program then to 13.3% at follow–up phase with insignificant statistical relation p. value > 0.05.

Table (1): Distribution of preparatory school students according to their demographic characteristics (n=800).

ITEMS	No	%
Age		
12 + years	92	11.5
13 +years	228	28.5
14 +years	268	33.5
15 +years	212	26.5
Gender		
Male	559	69.9
Female	241	30.1
Birth order		
First	236	29.5
Second	152	19.0
Third or more	412	51.5
Home Crowding Index		
Overcrowded (> 1.5)	310	38.8
Crowded (> 1.0)	267	33.4
Not crowded (<1)	223	27.8
Pocket money		
Not enough	492	61.5
Enough	308	38.5
Family type		
Nuclear family	648	80.9
Extended family	152	19.1

Table (2): Distribution of study sample of school students according to their Pattern of electronic devices usage (n=800).

Items	No	%
The duration time of electronic devices usage daily		
<2 hours	40	5.0
2-5 hours	84	10.5
>5-8 hours	404	50.5
> 8 hours	272	34.0
Time of using the electronic devices		
When wake up	50	6.2
After school time	40	5.0
Before sleeping	142	17.7
At weekend only	0	0.0
At any time	568	71.0
Frequency of electronic devices use daily		
Once	84	10.5
Twice	56	7.0
More than three times	360	45.0
Many times,	300	37.5
Using electronic devices when it is low battery or during charging		
Rarely	198	24.7
Sometimes	240	30.0
Always	362	45.3
What is the essential app used*		
Web	152	19.0
Email	196	24.5
Social media (face book- twitter- WhatsApp)	520	65.0
Videos (you tube)	80	10.0
The reason of electronic devices usage		
Playing	176	22.0
Listening to music	36	4.5
Share files	44	5.5
Browsing news	24	3.0
Chatting (Voice call)	520	65.0
Ability to use all options of electronic devices without help		
Poor	44	5.5
Moderate	168	21.0
Excellent	588	73.5
The importance of electronic devices		
First	536	67.0
Second	164	20.5
Third	100	12.5
***The electronic devices are usually used**		
Laptop	56	7.0
Smart phone / Tab	632	79.0
Computer	112	14.0
***The electronic devices accessories are usually used**		
Headphone (hand free)	601	75.1
Bower bank	399	49.9

*** Not mutually exclusive**

Figure (1): Distribution of the school students according to their total pattern of electronic devices usage through program implementation (n =800).

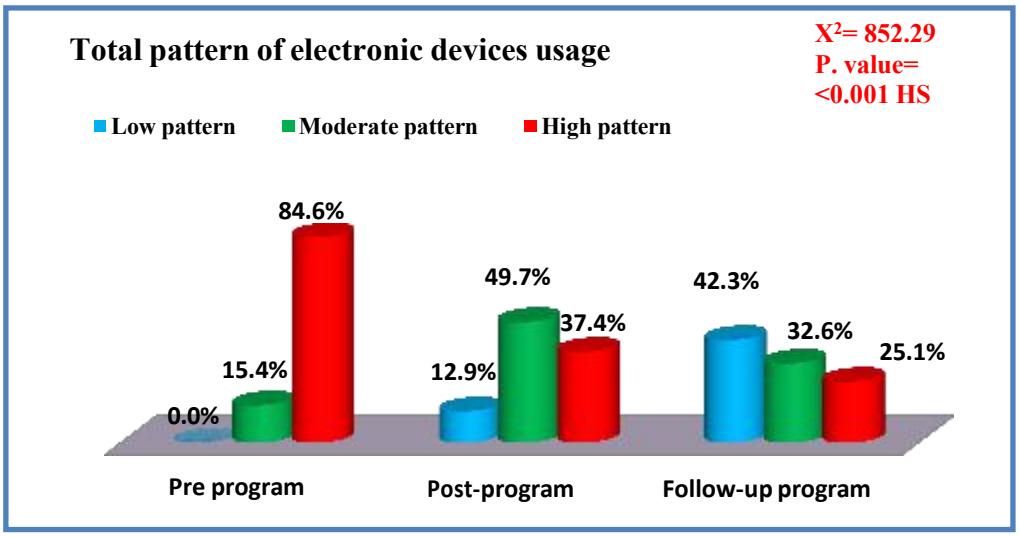

Figure (2): Distribution of the school students according to their total knowledge about health hazards of electronic devices usage through program implementation (n =800).

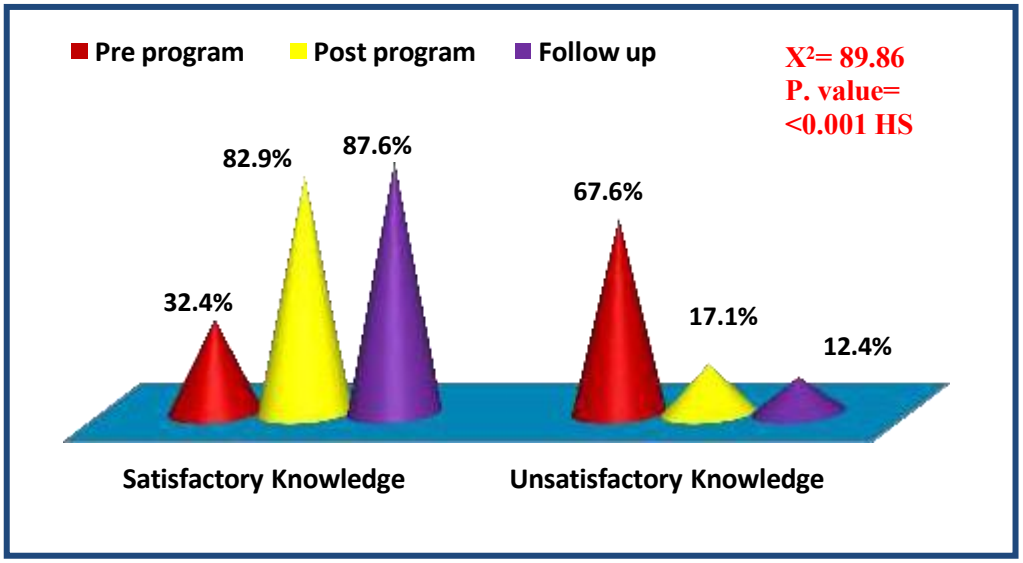

Table (3): Distribution of study sample of preparatory school students according to physical, social, and psychological health hazards of electronic devices affecting their health status (n=800).

Physical health hazards of electronic devices usage	No	%
The body weight increased	224	28.0
Disturbances of sleep pattern occurred	372	46.5
Disturbance in eating and drinking pattern to be unhealthy	328	41.0
Suffering from neck pain	348	43.5
Suffering from backache	424	53.0
Impairment of vision	228	28.5
Arthritis and hand cramps	178	22.25
Fatigue and joint pain	448	56.0

Physical health hazards of electronic devices usage	No	%
Lack of concentration in some activities need thinking	360	45.0
Smoking during computer usage	216	27.0
Social health hazards of electronic devices usage	No	%
Social media is considered your own world and all society	405	50.6
Feeling of shyness and refusing to attend social events	281	35.1
Preferring to stay on the electronic devices more than spending time with family.	240	30.0
Unsociable and lack of family dialogue	423	52.8
Feeling of laziness most time	552	69.0
Inactivity and social isolation	588	73.5
Constantly tending to talk about the usage of electronic devices or about the adventures and friendships in social media	600	75.0
Using the internet to create new relationships	560	70.0
Psychological health hazards	No	%
Increased violence and aggression	380	47.5
Feel of stress and depression	408	51.0
Feel upset when you are offline	332	41.5
Feeling of respect and attention on the internet more than you get from those around you in your life	444	55.5
Sometimes lying on the internet to show another character for you	268	33.5
Feel guilty if used the internet for longer than necessary	560	70.0
Tends to be isolated, which makes it difficult to communicate with those around him	468	58.5
Feeling of the defensive mode when asked about what you do on the internet	48	6.0
Feeling that life is dull, empty, and bleak without your own smart phone	401	50.1
Feeling of agitation and screaming when bothering during usage of devices	65	8.1
An attempt to reduce the time spent on chatting but failed	105	13.1

Table (4): The physical, social, and psychological health hazards effects through program implementation phases (n=800).

	Preprogram	Post program	Follow up	Chi-Square	P- value
	%	%	%		
Physical health hazards effect				**859.311 df= 2**	**0.000 HS**
Low negative effect	**83.00%**	**80.0%**	**79.0%**		
High negative effect	**83.00%**	**20.0%**	**21.0%**		
Social health hazards effect				**136.975 df= 2**	**0.000 HS**
Low negative effect	**34.50%**	**48.7%**	**63.70%**		
High negative effect	**65.50%**	**51.3%**	**36.30%**		
Psychological health hazards effect				**344.987 df= 2**	**0.000 HS**
Low negative effect	**16.30%**	**43.60%**	**61.50%**		
High negative effect	**83.70%**	**56.40%**	**38.50%**		

Table (5): Distribution of students' scholastic achievement effect through program implementation phases (n=800).

	Preprogram	Post program	Follow up	Chi-Square	P- value
	%	%	%		
Scholastic achievement:					
Excellent (≥85%)	**8.6**	**10.5**	**15.2**	**10.01 df= 5**	**0.2643 NS**
Very good (≥75%)	**14.3**	**18.1**	**21.0**		
Good (≥65%)	**22.8**	**27.6**	**30.5**		
Pass (≥50%)	**34.3**	**26.7**	**20.0**		
Fail (<50%)	**20.0**	**17.1**	**13.3**		

V. Discussion

Electronic devices have an impact on prep school kids' daily lives and are being widely acknowledged as a significant component of their social and educational environments. Thus, in recent decades, these forces have increased in visibility and volatility. All prep school students have access to several sorts of electronic devices, giving them access to a variety of learning, educational, and online experiences. The time spent communicating with colleagues and other friends is being replaced by all those media devices. Additionally, for a student in prep school, social interaction is essential. **(Fahad, 2012).**

This study explored the pattern of electronic devices usage and determined its negative effects on physical, social, and psychological health status of students which lead to poor scholastic achievement. Also, the study developed a prevention program according to the students' knowledge needs about health hazards related to usage of electronic devices and evaluate its effect on students' pattern suppression of usage, reduction of health hazards effects, and improving scholastic achievement.

Based on the study of **Grabianowski, (2012)** who pointed out that many prep-school children utilize electronic media on a regular basis, including television, video games, computers, and mobile devices. Therefore, the length of time that students spend using electronics will determine how much such media have an impact on their health and development. They ought to be carefully watched and kept within safe time limits when watching or playing on any of them because of this.

The present study showed that, more than one quarter of students aged 13years or more, and more than one third of them aged 14 years or more, while more than two thirds of them were male and less than one third were female. Also, more than half of them were ranked as the third child or more. Regarding family data, the majority of students' families were nuclear families, despite of there were less than two fifths of the students living in overcrowded homes and less than two thirds of them had not enough pocket money.

This finding agreed with a study done by **Zein El Dein (2013),** about teens at Shebin El-Kom, who have taken most of the same socio-demographic factors as our study, such as age and gender, home-crowding index, and type of family on the negative effects of regularly used electronic gadgets. But this result unsupported with study done on college students in Taiwan by **Chiu, et al., (2015)** about electronic devices usage who found that, females scored higher than males in the aspect of mobile addiction.

The noticed variations between the results related to demographic characteristics of study sample are due to the conduction of the study at different community with different social class and culture.

This finding conflicts with the findings of the research by **Beverly et al., (2016)** who found that the number of girls exceeded that of boys. Also, the result of the current study goes with a study done by **Houghton et al., (2017)**, on 2620 Australian students aged between 6-18 years old also found that fifty two percent of students were males. Another international study done by **Gsma, (2017)** between five countries including Egypt, study revealed that more than half of the children aged between 12-15 years old, and seventy five percent of students were males. This might be due to boys having more free time than girls spending all their free time using electronic devices.

The results of the current study also revealed that more than half of students ranked as the third child in their families. This result was opposite to a study done by **Moawad et al., (2017)** who conducted his study in Egypt on 230 of Mansoura students and found that, forty percent of students ranked at the first child in their family.

Regarding the family type the present study demonstrated that, majority of the study sample of students lived with nuclear families similar to the research conducted by **Balaji et al., (2014)** who found that, in the study which conducted in India there were 77.7% of the study sample were nuclear family. This might be due to the place of conducting the study in urban areas.

Related to the pattern of electronic devices usage, there were more than half of students using the electronic devices from 5 to 8 hours daily and more than one third of them used those devices for more than 8 hours where less than three quarters of students used it at any time and less than half of them used it frequently for more than three times daily which lead to using it when low battery or during charging usually for less than half of students**.**

Study findings is in line with the study was conducted in East Iran by **Bijari et al., (2017)** who reported that, the mean duration using of electronic devices ranged from 4 to 7 hours daily. But this result was not compatible with the study was conducted in China on adolescents by **Van den Bulck, (2017)** and showed that, the majority of adolescents used their electronic devices just before bedtime and those who did so more than once monthly, were likely to be tired during the day than those who did not.

This conclusion is completely consistent with the Ajman study by **Maryam et al. (2016),** which found that a significant portion of students (67.6%) spent more than 2 hours per day using their mobile devices. Additionally, 39.9% of pupils used computers or tablets for less than two hours, compared to 42.6% who did so. The average daily time spent using screens climbed from 5 to 7.5 hours for young people in the US over the past five years, which is in line with a study conducted in Australia by **Rideout et al. (2017)** that indicated that the average overall screen use much surpasses the recommended two hours.

The current study revealed that more than two thirds of students used social media as essential apps for chatting such as Facebook, twitter, and WhatsApp. Also, the majority of students usually used smart phones or tabs where less than three quarters of them were excellent in use all its applications without help while three quarters of them used headphones**.**

This result supported by the result of the study done by **Livingstone (2016)** in UK on students which reported that, all of students used the internet to play games online and login Facebook and other sites, moreover majority of them used the internet to watch movie. In addition, electronic devices activities by using the internet revealed that, more than one fifth (22.1%) of students browse Facebook, while (21 .3%) of them search the internet for video clips on YouTube from any device.

The Sleep in America Poll by the National Sleep Foundation, which found that almost all children had at least one to four media electronic devices in their bedrooms, supported the findings of the current study. Televisions (57%) were most commonly reported, followed by music players (90%), video game consoles (43%), computers (28%), and phones (64%). Additionally, a **GSMA** poll conducted in Egypt in **(2017)** revealed that 91% of Egyptian youngsters had a mobile phone and that 16% of young mobile user's own smartphones.

This finding is also consistent with a study by **Pempek et al. (2017)** conducted in Washington, which discovered that adolescents are drawn to mobile devices like smartphones and tablets because they offer a variety of applications that foster communication (like WhatsApp, Viber, etc.) and entertainment or even services (like shopping, education).

Regarding to the total pattern of electronic devices usage, the majority of school students used of electronic devices with highly pattern pre-program implementation, but this was improved to low pattern as an efficient effect of this program to become few (12.9%) of them after conducting the program and more than two fifth of them during follow-up the program with highly statistically significant difference X2= 852.29, P. value= < 0.001.

In this study, there were more than two thirds of school students had unsatisfactory knowledge toward prevention of health hazards of electronic devices pre prevention program implementation and was improved to satisfactory level as an efficient effect of this program to become the majority of them after conducting the program and the majority of them during follow-up the program with highly statistically significant difference X2= 89.86 P. value= < 0.001. This agrees with a study conducted by **Pendse and Zagade (2014)** who mentioned that the majority of adolescents had unsatisfactory level of knowledge about health hazards related to long time mobile phone usage.

The effects of electronic media and devices on our children's cognitive, social, behavioral, and physical health are becoming more and more clear, according to research papers. The present study has clearly shown that more than one quarter of students suffered from overweight, less than half of them complained of sleep pattern disturbance, more than two fifth of the students reported that, they have disturbance in eating and drinking pattern to be unhealthy and more than two fifth of them and more than half suffered from neck pain and backache respectively also more than half for fatigue and joint pain. In addition to that, 28.5 % of students complain of vision impairment also 27% of them smoked during computer usage.

The findings of the study conducted by **Pathak et al., (2016)** in the study on (addiction of gadgets and its impact on health of youth). The study's findings revealed that 72% of respondents had physical health issues with their hearing due to earphones, 79% reported headaches, 60% reported sleep issues, 45% reported problems with their thinking and memory, 85% reported depression issues, and 69% reported problems with mental stability, indicating that more people were experiencing changes in their health status and issues with their hearing, obesity, sleep issues, anxiety, and vision impairment.

As well as the current study supported by the study done by **Thomée, and Hagberg (2016) & Abdullah et al., (2018)** who found that more than 30% of adolescents, of both sexes, experience moderate headaches from prolonged mobile phone use, or musculoskeletal issues from texting. According to a message, symptoms linked to mobile phone use include headaches, earaches, warmth in the ears, perceived difficulty concentrating, and fatigue.

Regarding to sleeping pattern of adolescents, this study showed that less than half of them have sleeping problems also these findings was unsimilar to the result of **Pathak et al., (2016)** who conducted the study on 456 high school aged female adolescents in Egypt, who stated in her study that high internet usage had a significant relationship with poor sleep. This might be due to uncontrolled usage of the internet for a long time.

Also, the current study presents that, about half of studied students considered the social media their own world and all society surrounded, more than one third of them felt of shyness and refused to attend social events, more than half of them were unsociable and had lack of family dialogue, and more than two third of students felt of laziness most time. Also, the present study shows that less than three quarters of students were inactive and socially isolated while more than two thirds of them used the internet to create new relations.

In school-age children, the use of digital technology has been linked to difficulties with sleep, obesity, physical inactivity, and violent conduct. Children squander their time inefficiently due to the overuse of digital technology. The influence that these technologies have on children's cognitive and emotional development should also be taken into consideration **(Brown, 2016).**

Regarding the psychological health hazards, there were less than half of them felt with increasing violence and aggression attitude, about half of them felt of stress and depression, more than two third of them felt guilty feeling if the internet was used for longer than necessary, and more than half of them tended to be isolated, which made it difficult to communicate with those around them. Also, about half of them felt that their life is dull, empty, and bleak without their own smart phone.

According to **Cain and Gradisar, (2017).** Use of electronic media, particularly Internet and mobile phone activities connected to social networking right before bed, is positively correlated with sleep issues, with stress and depression playing a significant role.

presents that, there are noticed improvement of physical health hazards effect through prevention program implementation process which represent 83% of students were affected highly negative preprogram but after implementation became 20% and at follow-up it became 21%. In addition to changed positively in social and psychological health hazards effect of electronic devices on students' health through program implementation with highly statistically significant differences with p value < 0.001. These findings supported by **Nayak (2016)** who reported that More people reported changes in

their health condition or health issues such hearing loss, obesity, sleep problems, anxiety, visual problems, and physical pain. Students benefited from safe practices and healthy usage when utilizing electronic gadgets.

As regards the students' scholastic achievement effect through program implementation process, there was noticed ameliorate in scholastic achievement after prevention program implementation. The study result showed improvement in scholastic achievement in pre and post program.This result matching with **Lakshmana et al., (2017),** who conducted his study in 3 private schools in 300 students in 3 private schools in city of Gwalior, Madhya Pradesh in North Indian City, who stated in his study which entitled "pattern of internet among adolescent school students of a North Indian City" that 28.66% of study sample admitted that their schoolwork was often delay or in complete due to spending more time on internet.

Computers and other forms of technology are actually excellent learning aids, but they cannot replace student-to-teacher or student-to-student connection. Children's classrooms that completely replace talk with technology suffer from disconnected learning and deteriorated group-building skills **(Ritchell, 2016).**

The deterioration in scholastic achievement of students is due to their excessive internet use, which interferes with the time set out for studying. Because of this, the key to letting kids use technology and letting them do it in a healthy way is to keep it under control and in moderation.

VI. Conclusion

The study concluded that there was statistically significant efficacy of the prevention program on improving the health pattern for school students and their knowledge, about prevention of health hazards and pattern related to electronic devices usage. As well, the program had significant effect on decreasing the negative effect of physical, social, and psychological health hazards, in addition to enhancing scholastic achievement through program implementation phases with significant statistical difference (P< .0001).

VII. Recommendations

Based on the results of the present study, it can be recommended that:

- The study recommended that, periodical health education about prevention of health hazards related to usage of electronic devices is necessary to raise school children's awareness and improve their health status which leads to enhancing the scholastic achievement.
- Publication and dissemination of the prevention program in all schools to raise students' awareness about the health hazards related to usage of electronic devices to prevent its complications.

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