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Relation between Problematic Smartphone Use and Obesity among Adolescents

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Abstract: Background: Smartphone use grows annually, problematic Smartphone use (PSU) is frequently viewed as a type of technology addiction caused by unrestrained and excessive usage of Smartphones. **Purpose**: To assess the relation between problematic Smartphone use and obesity among adolescents. **Methods**: A descriptive correlational research design was utilized. **Setting**: the study was carried out at Nutrition clinic of the Gastroenterology and Clinical Nutrition Unit in the Pediatrics Department and Pediatric Nutrition outpatient clinic at Tanta Main University Hospitals, Egypt. **Sampling**: A purposive sample of 250 adolescents aged 12-18years was included. **Instruments**: Three instruments were used (Structured Interview Questionnaire, Smartphone Addiction Scale Short Version, Digital glass weight scale). **Results**: More than three quarters (80.8%) of adolescents were Smartphone addict and had problematic Smartphone use. A statistically significant difference was observed between the Smartphone addict group adolescents and the non Smartphone addict group adolescents; with regard to the category in which the adolescents' body mass index falls (obesity category).Additionally, a statistically significant and extremely positive correlation was found between Smartphone addiction and BMI. **Conclusion**: There was a strong relation between obesity and Smartphone addiction or PSU, as Smartphone addiction resulted in an increase in the obesity rate among adolescents. **Recommendations**: awareness programs should be provided for adolescents especially those suffering from obesity about the seriousness and consequences of Smartphone misuse and addiction on their health status.

Keywords: *Adolescents, Obesity, Problematic Smartphone Use*

Introduction:

A Smartphone is a type of electronic gadget which incorporates a portable computer and a mobile phone. It usually has text and email capabilities, internet access, and strong data (Ometov, 2020). More and more research is showing that excessive Smartphone use can harm both physical and mental health, including causing neck issues and poor sleep quality, as

well as greater degrees of worry and despair (Elhai, Dvorak, Levine, & Hall, 2021).Face-to-face sociability spaces have been replaced by virtual ones due to the new mobile technologies. Individuals' conduct has changed as a result, particularly among today's youth. Prior research has established a clear connection between problematic Smartphone use and number of illnesses, such as eating disorders, stress, attention deficit hyperactivity disorder, and depressive disorders (Al Abdulwahab, Kachanathu &Al Motairi, 2022).

There is considerable disagreement about whether "problematic use" should be characterized by the frequency of use, usage patterns, or adverse effects of use. Conducted a widely referenced evaluation of the research on dysfunctional Smartphone usage and classified problematic Smartphone use as incapacity to control Smartphone use, which ultimately has detrimental effects on day-to-day living" (Li, Hou &Yang, 2019). There is substantial evidence linking Smartphone usage to mental health, social, interpersonal, cognitive, and academic difficulties that may have serious detrimental effects on certain people among Chinese adolescents (Annoni, Petrocchi , Camerini & Marciano , 2021 ; Ometov, 2020; Van , 2020).

Previous research has defined problematic Smartphone use of as a persistent and excessive pattern of Smartphone use accompanied by recognized impairments in everyday functioning, that included daily-life disturbance, positive anticipation, withdrawal, overuse, and tolerance(Fischer, Kothgassne, &Felnhofer, 2019; Van, Alexander, Colin Sabrina, & Piet, 2020). Studies have revealed some evidence of the negative effects of excessive and dangerous Smartphone use on adolescent well-being and quality of life, despite disagreements over whether these behaviors ought to be classified as Smartphone "addiction." Problematic Smartphone Use of is the term used in this study to describe excessive and detrimental Smartphone use, specifically compulsive behaviors associated with Smartphone (Karki, Singh, Paudel, Khatiwada& Timilsina, 2020).

Regarding the relationship between Smartphone use and nutritional status, the scientific evidence is not entirely clear. As a result, the goal of this research is to link teen obesity with Smartphone use (Ophir, Rosenberg, Lipshits& Amichai 2020). A crucial aspect of overall adolescent health care is nutrition. Adolescent changes may result in a nutritional crisis. Regular home-cooked meals may give way to quick food, inadequate snacks, irregular meals, and skipped meals. Additionally, obesity is as a chronic, recurrent medical problem that arises from an imbalance between energy intake and expenditure, which can be caused by excessive calorie intake, a sedentary lifestyle, or both (Dawason &Trapp, 2019).

The World Health Organization (WHO) reports that 55% of individuals under the age of 18 are overweight or obese globally. One in five kids and teenagers are affected by its prevalence. Over the past 30 years, adolescents in Mexico between the ages of 12 and 19

have been experiencing an increase in this issue. The frequency of overweight has risen sharply from 8% in 1990 to 20% in 2022 among children and adolescents aged 5 to 19 years (Mohamed & Mostafa, 2020).

Significance of the Study:

Adolescents are the most susceptible group of Smartphone users to problematic Smartphone use (PSU), according to several researches, due to their impressionability during this developmental stage. Adolescents also accept and embrace digital platforms and conventions for communication through social networking, gaming, streaming videos, and entertainment (Panova & Carbonell, 2018).

Dependency on technology takes the role of bodily function, with the justification that using a device makes the intended function easier and physical tasks take too much time (Van, 2020). Subsequently, their physical activity levels drop, this causes a gap between the energy consumed through food and the energy expended through physical exercise, ultimately leading to weight gain and obesity.

Purpose:

To assess the relation between problematic Smartphone use and obesity among adolescents.

Definition of variables:

1) Problematic Smartphone use

Problematic Smartphone use (PSU) is exaggerated, harmful, and uncontrolled usage of Smartphone. Smartphone use was considered problematic if the score of Smartphone Addiction Scale was more than 31 for males and more than 33 for females (see instrument no. two).

2) Obesity:

It is the increase in body weight (more than 95%, it will be assessed using Anthropometric measurements : Measuring weight –height to estimate Body Mass Index (BMI) – for Age Percentile to identify adolescents' obesity). It will be assessed using (instrument no., three).

Research question:

What is the relation between obesity and problematic Smartphone use among adolescents?

Methods

Research Design:

A descriptive correlational research design was utilized in this study.

Setting:

The study was carried out at Nutrition Clinic of the Gastroenterology and Clinical Nutrition Unit in the Pediatrics Department and Pediatric Nutrition Outpatient Clinic at Tanta Main University Hospitals which are affiliated to the Ministry of Higher Education and Scientific Research, Egypt.

Sampling:

A purposive sampling approach of 250 adolescents aged 12-18 years was included.

Inclusion criteria:

- Adolescents who own or use Smartphone regularly for at least 3 months ago.

Exclusion criteria:

- Adolescents who suffer from endocrinological diseases (diabetes mellitus, thyroid gland problems, further illnesses affecting the control of glucose, and pancreatic secretion and other endocrinal gland conditions) that cause spontaneous gaining weight.
- Adolescents on long-term medications as corticosteroids or psychiatric medications that may interfere with their nutritional status and cause weight gain.

Instruments

Instrument one: Feeding and health behavior of adolescence structured interview questionnaire:

It was created by the researcher using a literature review. (Aşut, Abuduxike & Acar-Vaizoğlu, 2019; Li , Hou &Yang , 2019). It consists of 4 parts:

- **Part 1: Characteristics of adolescents**: age, gender, birth order, educational level, place of residence, the financial status of the adolescent's family and with whom the adolescent lives.
- **Part2: Adolescent's feeding pattern during the last 30 days**: types of foods or drinks adolescent prefer to have especially during Smartphone use, the effect of excessive Smartphone use on adolescents' appetite and frequency of increased desire to eat meals or snacks especially at time of using Smartphone.
- **Part 3: Adolescent's health behaviors related to physical activities during the last 30 days**: duration of daily indoor physical activities, duration of daily outdoor physical activities, types of outdoor physical activities, duration of daily sitting/resting period and type of daily activities that done during a period of rest or sitting.
- **Part 4: Adolescent's habituations about Smartphone usage during the last 30 days**: having personal Smartphone or using a family member Smartphone on a daily and continuous basis, how long does adolescent have or use Smartphone, average daily hours spent on Smartphone screen in the last 30 days (hr/ day), average daily hours of Non-Smartphone screen use in the last 30 days (hr/ day), Smartphone control over adolescent to the extent that can't manage how and for how long use it.

Instrument two: Smartphone Addiction Likert Scale Short Version (SAS-SV):

It is a validated and widely used tool for evaluating PSU that has already been translated into a number of languages including Italian, German and Arabic. The Arabic and English Smartphone Addiction Scale Short Version (SAS-SV) has been validated in both languages. The internal consistency and concurrent validity of SAS-SV were verified (Cronbach's alpha = 0.967) to explore the prevalence of PSU. This scale is adopted from (Fathallah, 2019), which was delivered from its original longer version for Kwon et al., 2013).This scale contains 10 items, and each one is scored on a self-administered Likert scale that extends from 1(strongly disagree) to 6 (strongly agree). Positive

anticipation, withdrawal symptoms, cyberspace-oriented relationships, tolerance, overuse, and daily-life disturbance are the six content domains that compose the structure of SAS-SV.

Scoring system:

The total number of answers related to SAS-SV was scored as follows;

- Non-addict male when the total number of SAS-SV responses was 31 or less
- Addict male when the total number of SAS-SV responses was more than 31
- Non-addict female when the total number of SAS-SV responses was 33 or less
- Addict female when the total number of SAS-SV responses was more than 33

Instrument three: Digital glass weight scale:

It was made by Other, Egypt (The first product availability date was 1 June 2021). It measures weight which ranges from zero to 150 kg.

BMI Category	BMI Range
• Underweight	• Less than the 5 th percentile
• Normal or healthy weight	• 5th percentile to less than the 85th percentile
• Overweight	• 85th to less than the 95th percentile
• Obese	• 95th percentile or greater

"BMI categories and Percentiles for children and adolescents aged 2- 19 According to the Egyptian Growth Charts 2002"

Methods:

Ethical and legal considerations:

a) Ethical approval to conduct the study was granted from scientific research ethical committee of Faculty of Nursing at Tanta university prior to carrying out the study with code number 540-10-2024

b) The study's nature did not injure or hurt any of the participants.

c) Confidentiality and privacy regarding the data collection was taken into consideration.

d) Verbal and written informed consent was taken from adolescents and their parents to participate in the study. They were informed that their participation in the study was

completely voluntary and that they might leave at any moment.

The content validity index (%) of all the questionnaire's items was determined by consulting specialists in pediatric nutrition and community health nursing. The results showed that the content validity of the questionnaire was 95%.

Reliability:

The value of Cronbach's alpha coefficient was 0.90 for instrument one and three. The instrument two is adopted from an Egyptian adolescence study (Fathalla, 2019) who reported that the internal consistency of the translated SAS-SV was adequate. Cronbach's alpha ranged from 0.745 to 0.893 to all items. Reliability coefficient for all the scale was high (alpha = 0.904) so, those who are likely to be classified as "Smartphone Addicted" in Egypt can be easily identified with the usage of this tool throughout the screening procedure.

Pilot study:

Tests of the instruments' clarity, application, and reliability were conducted on 10% of the entire sample (n=250) in order to determine the amount of time it took each subject to complete each instrument. The necessary changes, such as rearranging the questions and restating some things, were made in response to the pilot study's findings. The sample used for the pilot study was not included in the overall sample.

Procedure:

An official permission was obtained from the Dean of the faculty of the nursing Tanta University and the Hospital directors of the selected setting (Nutrition clinic of the Gastroenterology and Clinical Nutrition Unit in the Pediatrics Department and Pediatric Nutrition outpatient clinic at Tanta Main University Hospitals) for the to conduct this study on 15/11/2024

Meeting with adolescents was put into place before the data gathering step started in order to build a good rapport, verify the research's viability, as well as provide a succinct description of the study's purpose.

- data was collected through face to face interview using a single survey questionnaire at Nutrition clinic of the Gastroenterology and Clinical Nutrition Unit in the Pediatrics Department and Pediatric Nutrition outpatient clinic at Tanta Main University Hospitals.
- The researcher attended to the Nutrition clinics at the previously mentioned setting to collect the data 3 days a week from 9 am to 12 pm during the period of data collection. Data was gathered between the middle of November 2024 and the end of February 2025.
- In order to build trust and collaboration with the adolescents, the researchers introduced themselves to the participants and described the purpose of the study instruments before starting the data collection process. The researcher distributed the questionnaires on all studied adolescents and guided them. The detailed questionnaire items were explained, and adolescents had the opportunity to ask any question during the interview. Every query about the study materials was addressed.

Participants received an explanation that was both straightforward and thorough.

- The studied adolescents were asked to completely fill in a questionnaire by themselves regarding several variables, covering (instruments one and two).
- Anthropometric measurements: (weight–height) were assessed to estimate Body Mass Index (BMI) – for Age Percentile to identify obesity. It was done by the researcher to categorize adolescent's BMI in order to determine where the adolescent stands in comparison to other adolescents of the same age and gender.
- So, studied adolescents were instructed to stand upright, wear light clothing, and go barefoot to measure height to the closest 0.1 cm and body weight were uniformly measured to the closest 0.1 kg using digital glass weight scale (Other, Egypt). The ratio of weight in kilograms to height in meters squared was used to compute BMI. The results of BMI were plotted on the Egyptian growth charts based on the BMI-based age and sex-specific criteria of obesity in Egypt, the studied adolescents were categorized into 4groups: underweight, normal, overweight, and obese.
- Each adolescent needed approximately twenty-five to thirty minutes to finish the study instruments and carry out the necessary revisions to ensure that no data was missed.

Statistical analysis

Data was entered and analyzed on a computer using IBM SPSS software, version 20.0. Numbers and percentages were used to express qualitative data. The quantitative data was explained using the range, mean, and standard deviation. A chi-square test was utilized for the comparison of the two studied groups. However, Fisher Exact test was used for Correction of chi-square when more than 20% of the cells have expected count less than 5. We used a 5% level of significance to evaluate the results.

Results

Table 1 shows distribution of the studied adolescents according to their characteristics. It was found that less than three quarters (74%) of adolescents aged 12-14 years while only 10% of them aged >16-18 years. Also, it was observed that 59.6% of adolescents were males. Regarding level of education, half (50%) of adolescents were at preparatory school. Fewer than two thirds (61.6%) of adolescents lived in urban.

Table 2 presents distribution of the studied adolescents according to their feeding patterns during the last 30 days. Regarding types of foods or drinks adolescent prefer to have especially during Smartphone use, the majority (94.4%) of adolescents prefer to eat fast foods such as instant noodles frequently and 86% of them prefer to drink juices and sugar-sweetened drinks frequently. In respect to the effect of excessive Smartphone usage on adolescents' appetite, it shown that more than three quarters (76%) of adolescents had polyphagia and 14% of adolescents' appetite wasn't affected at all, however only 10 % of them had anorexia due to their excessive Smartphone use

Table 3 illustrates distribution of the studied adolescents according to their health behaviors related to physical activities during the last 30 days. About 40.8% of adolescents had 2-4 hours of sitting or resting period daily. And more than one third (34%) of them had 4-6 hours of sitting or resting period daily. The majority (97.2%) of adolescents spent their daily sitting period in watching TV or playing electronic games on Smartphone. However, only 16% of them spent their daily sitting period in reading books and novels or learning a new language.

Table 4 demonstrates distribution of the studied adolescents according to their habituations about Smartphone usage during the last 30 days. It was shown that 40.4% of adolescents spent 2-4 daily hours on Smartphone screen and more than one third (34.4%) of them spent 4-6 daily hours on Smartphone screen in the past 30 days. All of adolescents (100%) used Smartphone for the purposes of social media networks such as "Twitter/Face book/Messenger and online community forums" and entertainment such as "videos/movies/music and playing games". More than three quarters (79.6%) of adolescents found that Smartphone control them to the extent that they cannot manage how and for how long use it.

Figure 1 clarifies distribution of the studied adolescents according to total scores and levels of Smartphone Addiction in each sex. It was found that more than three quarters (80.8%) of adolescents were Smartphone addict and had problematic Smartphone use and more than half (59.4%) of them were males. Only 19.2% of adolescents were not Smartphone addict and had not problematic Smartphone use, 60.4% of them were males also.

Table 5 presents distribution of the studied adolescents according to their Anthropometric measurements. It was found that more than three quarters (76%) of adolescents' BMI Percentiles fall in (95th-97th) zone and obesity category.12.4 % of adolescents' BMI Percentiles fall in (85th- less than 95th) zone and overweight category. However, only 11.6% of adolescents' BMI Percentiles fall in (5th -less than 85th) zone and normal weight category.

Table 6 shows the relation between non addicts and addicts according to their age, sex and habits. It was discovered that there were indeed statistically significant differences between the Smartphone addict group adolescents and the non Smartphone addict group adolescents in relations to age, types of foods or drinks adolescent prefer to have especially during Smartphone use, the effect of excessive Smartphone use on adolescents' appetite, duration of indoor physical activities daily, duration or time of sitting/resting daily, average daily hours spent on Smartphone screen in the past 30 days, control of Smartphone on adolescents , and the category in which the Adolescent's body mass index falls. ($p \leq 0.05$ for each parameter)

Table 7 represents correlation between Smartphone Addiction and BMI of the studied adolescents. A statistically significant and extremely positive correlation was found between Smartphone addiction and BMI ($p < 0.001$*).

Table (1): Distribution of the Studied Adolescents according to their Characteristics (n = 250)

Adolescent's characteristics	No.	%
Age (years)		
12 – 14	185	74.0
>14 – 16	40	16.0
>16 – 18	25	10.0
Min – Max.	12.0 – 18.0	
Mean ± SD.	13.84 ± 1.73	
Sex		
Male	149	59.6
Female	101	40.4
The adolescent's birth order among his/her siblings		
First	94	37.6
Second	51	20.4
Third	63	25.2
Another mentioned	42	16.8
Educational Level		
Primary school	75	30.0
Preparatory school	125	50.0
Secondary school	50	20.0
Place of Residence		
Rural	96	38.4
Urban	154	61.6
The financial status of the adolescent's family		
Very high	0	0.0
Somewhat high	64	25.6
Moderate	149	59.6
Slightly below average	29	11.6
Very low	8	3.2
With whom the adolescent lives		
With both parents together	212	84.8
With only one parent	22	8.8
With people other than parents providing care for him	12	4.8
Lives alone	4	1.6

SD: Standard deviation

Table (2): Distribution of the studied adolescents according to their feeding pattern during the last 30 days (n = 250)

Adolescent's feeding pattern	No.	%
Types of foods or drinks adolescent prefer to have especially during Smartphone use#		
Eating vegetables, fruits and proteins	88	35.2
Eating fast foods such as instant noodles frequently	236	94.4
Eating chips/biscuits, baked goods, and starches frequently	200	80.0
Drinking juices and sugar-sweetened drinks frequently	215	86.0
The effect of excessive Smartphone usage on adolescents' appetite		
It causes loss of appetite (anorexia)	25	10.0
It causes excessive appetite (polyphagia)	190	76.0
It does not affect appetite at all	35	14.0
Another mentioned	0	0.0
I don't know	0	0.0
Frequency of increased desire to eat main meals or snacks especially at time of using the Smartphone		
I always feel that way	60	24.0
I often feel that way	157	62.8
Sometimes I feel that way	18	7.2
I rarely feel that way	9	3.6
I never feel that way	6	2.4

#: More than one answer

Table (3): Distribution of Studied Adolescents According to Their Health Behaviors Related to Physical Activities during the Last 30 Days (n = 250)

Adolescent's health behaviors related to physical activities	No.	%
Duration of daily indoor physical activities that you do		
10 minutes a day	28	11.2
10-30 minutes a day	20	8.0
30-60 minutes a day	30	12.0
Another mentioned	0	0.0
I do not practice any physical activity inside the home	172	68.8
Duration of daily outdoor physical activities that you do		
10 minutes a day	22	8.8
10-30 minutes a day	41	16.4
30-60 minutes a day	31	12.4
Another mentioned	0	0.0
I do not practice any physical activity outside the house	156	62.4
Types of outdoor physical activities you do #		
Jogging or running	50	20.0
Riding a bicycle	31	12.4
Playing football	61	24.4
Another mentioned	0	0.0
I do not practice any type of physical activity outside the home	156	62.4
Duration of daily sitting/resting period for you		
1-2 hours	53	21.2
2-4 hours	102	40.8
4-6 hours	85	34.0
6-8 hours	10	4.0
Another mentioned	0	0.0

Continue

Types of daily activities done during a period of rest or sitting#		
Communication with friends through social media	174	69.6
Reading books and novels or learning a new language	40	16.0
Watching TV or playing electronic games on Smartphone	243	97.2
Participating favorite hobbies such as drawing or music	64	25.6
Another mentioned	0	0.0

#: More than one answer

Table (4): Distribution of the studied adolescents according to their habituations about Smartphone usage during the last 30 days (n = 250)

Adolescent's habituations about Smartphone usage	**No.**	**%**
Do you have personal Smartphone or use a family member's Smartphone on a daily and continuous basis?		
No	250	100.0
Yes	0	0.0
If the answer to the previous question is yes: How long have you owned or used this Smartphone?		
3 months ago	12	4.8
3- 6 months ago	25	10.0
6- 9 months ago	55	22.0
From 9 months to a year	88	35.2
One year or more	70	28.0
Average daily hours spent on Smartphone screen in the past 30 days		
1- 2 hours a day	49	19.6
2- 4 hours a day	101	40.4
4- 6 hours a day	86	34.4
6- 8 hours a day	14	5.6
Another mentioned	0	0.0
Average daily hours of non-Smartphone screen use (such as a TV or laptop) in the past 30 days		
1- 2 hours a day	64	25.6
2- 4 hours a day	96	38.4
4- 6 hours a day	90	36.0
6- 8 hours a day	0	0.0
Another mentioned	0	0.0
Times of having a strong desire to use the Smartphone when it is not supposed to be used #		
Just before bedtime or at bedtime	123	49.2
At mealtime	190	76.0
While receiving school lessons	28	11.2
Time allocated for studying or doing schoolwork	165	66.0
Another mentioned	0	0.0
Your most frequently purposes for using Smartphone are among the following#		
Learning, receiving educational lessons, and searching for useful information	45	18.0
Social media networks such as "Twitter/Face book/Messenger and online community forums"	250	100.0
Entertainment such as "videos/movies/music and playing games"	250	100.0
Shopping or paid work on the Internet	0	0.0
Another mentioned	0	0.0
The place where you often put your Smartphone during sleeping		
In your bedroom, under your pillow or in your hand	151	60.4
In your bedroom, near your bed	52	20.8
In your bedroom, away from your bed	29	11.6
Outside your bedroom	18	7.2
Another mentioned	0	0.0
Control of Smartphone over adolescent to the extent that can't manage how and for how long use it:		
No	51	20.4
Yes	199	79.6

#: More than one answer

Figure (1): Distribution of the studied adolescents according to total scores and levels of Smartphone addiction in each sex (n = 250)

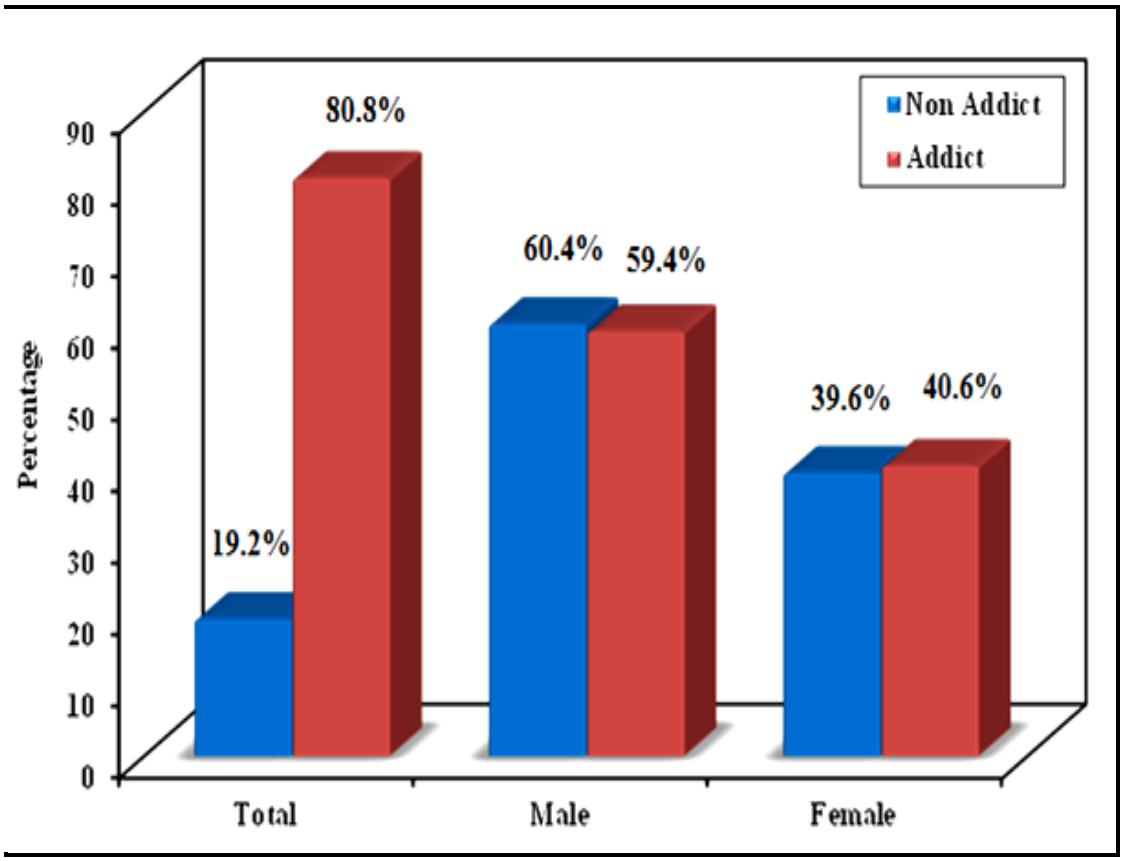

Table (5): Distribution of the Studied Adolescents According to Their Anthropometric Measurements (n = 250)

Adolescent's anthropometric measurements	No.	%
Height(m)		
Min – Max.	1.36 – 1.79	
Mean ± SD.	1.61 ± 0.08	
Weight(kg)		
Min – Max.	48.0 – 95.0	
Mean ± SD.	74.96 ± 10.37	
BMI Percentile (%)		
Less than 5th	0	0.0
5th -less than 85th	29	11.6
85th- less than 95th	31	12.4
95th-97th	190	76.0
Category in which the Adolescent's body mass index falls		
Underweight (< 18.5)	0	0.0
Normal weight (18.5 – 24.9)	29	11.6
Over weight (25.0 – 29.9)	31	12.4
Obesity (≥ 30.0)	90	76.0

Table (6): Relation between Non Addicts and Addicts According to Their Age, Sex and Habits

	Non Addict (n = 48)		Addict (n = 202)		χ^2	p
	No.	%	No.	%		
Age (years)						
12-14	30	62.5	155	76.7		
>14 – 16	5	10.4	35	17.3	19.556*	0.001*
>16 – 18	13	27.1	12	5.9		
Sex						
Male	29	60.4	120	59.4	0.016	0.898
Female	19	39.6	82	40.6		
Types of foods or drinks adolescent prefer to have especially during Smartphone use#						
Eating vegetables, fruits and proteins						
Eating fast foods such as instant noodles frequently	25	52.1	63	31.2	7.424*	0.006*
Eating chips/biscuits, baked goods, and starches	25	52.1	193	95.5	65.634*	<0.001*
frequently	45	93.8	155	76.7	7.020*	0.008*
Drinking juices and sugar-sweetened drinks frequently	44	91.7	160	79.2	4.010*	0.045*
The effect of excessive Smartphone use on adolescents' appetite						
It causes loss of appetite (anorexia)	18	37.5	7	3.5		
It causes excessive appetite (polyphagia)	16	33.3	174	86.1		
It does not affect appetite at all	14	29.2	21	10.4	68.916*	<0.001*
Another mentioned	0	0.0	0	0.0		
I don't know	0	0.0	0	0.0		
The duration of indoor physical activities that you do daily						
10 minutes a day	4	8.3	24	11.9		
10-30 minutes a day	14	29.2	6	3.0		
30-60 minutes a day	20	41.7	10	5.0	97.142*	<0.001*
Another mentioned	0	0.0	0	0.0		
I do not practice any physical activity inside the home	10	20.8	162	80.2		
The duration or time of sitting/resting for you daily						
1-2 hours	20	41.7	33	16.3		
2-4 hours	14	29.2	88	43.6	15.023*	0.002*
4-6 hours	12	25.0	72	35.6		
6-8 hours	2	4.2	9	4.5		
Average daily hours spent on Smartphone screen in the past 30 days						
1- 2 hours a day	4	8.3	45	22.3		
2- 4 hours a day	16	33.3	85	42.1		
4- 6 hours a day	27	56.3	59	29.2	16.389*	0.001*
6- 8 hours a day	0	0.0	14	6.9		
Another mentioned	0	0.0	0	0.0		
Control of Smartphone on adolescents to the point that adolescent cannot control how and for how long use it						
No	15	31.3	36	17.8	4.307*	0.038*
Yes	33	68.8	166	82.2		
Category in which the Adolescent's body mass index falls						
Underweight (< 18.5)	0	0.0	0	0.0		
Normal weight (18.5 – 24.9)	10	20.8	19	9.4	7.621*	0.022*
Over weight (25.0 – 29.9)	2	4.2	29	14.4		
Obesity (≥ 30.0)	36	75.0	154	76.2		

χ^2: Chi square test
p: p value for comparing between the studied categories
*: Statistically significant at $p \leq 0.05$

Table (7): Correlation between Smartphone Addiction and BMI (n = 250)

SAS–SV vs.	Total (n = 250)	
	r	p
BMI	0.231*	<0.001*

r: Pearson coefficient
*: Statistically significant at $p \leq 0.05$

Discussion

This study aimed to assess the relation between problematic Smartphone use and obesity among Adolescents. Regarding types of foods or drinks adolescent prefer to have, especially during Smartphone use; the majority of adolescents prefer to eat fast foods such as instant noodles frequently and two quarter of them prefer to drink juices and sugar-sweetened drinks frequently, as the research see the need rabid source of energy during time spent on Smartphone use so they get it from noodles and sugar-sweetened drinks and this had bad effect on their health. This finding in agreement with Bozkurt , Özer , Şahin, (2023) who studied" Internet use patterns and Internet addiction among children and adolescents with obesity" in the Turkish Republic of Northern Cyprus and found that (90.4%) of adolescents prefer to eat fast foods such as instant noodles frequently and (83%) of them prefer to drink juices and sugar-sweetened drinks frequently.

Regarding the effect of excessive Smartphone use on adolescents' appetite, it was shown that more than three quarters of adolescents had polyphagia. Less than two thirds of adolescents often feel that their desire to eat main meals or snacks is increased especially at time of using the Smartphone.This finding was in agreement with Aşut , Abuduxike & Acar (2019) who studied" Relationships between screen time, internet addiction and other lifestyle behaviors with obesity" among secondary school students in the Turkish Republic of Northern Cyprus and found that (77%) of adolescents had polyphagia due to their excessive Smartphone use and (65%) of adolescents found that Smartphone control them to the extent that they cannot control how and for how long they use it.

Regarding health behaviors related to physical activities of the studied adolescents. It was found that more than two third of adolescents did not practice any indoor physical activities. Also, less than two thirds of adolescents did not practice any outdoor physical activities. However, the majority (97.2%) of adolescents spent their daily sitting time watching TV or playing electronic games on Smartphone. This is similar to the research conducted in Sylhet, Bangladesh by Ferdous, (2021) among adolescents reported, more than two thirds of surveyed adolescents didn't do any physical activity inside the home and the majority of adolescents spent their daily sitting time in.

From the researcher's point of view, these findings emphasize the need for

creating basic levels of awareness of the adverse consequences of Smartphone usage as it affects their physical activity where their physical activities become limited and less than before, that turn to create an imbalance between the energy intake and that is gained from food consumption and the energy expenditure that is loosen through physical activities leading to gaining overweight and obesity. So, some information regarding the harmful effects of Smartphone overuse can help in the adoption of healthy practices right from the early phases of life. Thus, imparting knowledge and creating awareness regarding the adverse effects of Smartphone usage and addiction among adolescents and early youth is very essential.

Regarding the habituations Smartphone usage of the studied adolescents, it was shown that less than one half of adolescents spent 2-4 daily hours on Smartphone screen and more than one third of them spent 4-6 daily hours on Smartphone screen in the past 30 days. And all of adolescents used Smartphone for the purposes of social media networks such as "Twitter/Face book/Messenger and online community forums" and entertainment such as "videos/movies/music and playing games". More than three quarters of adolescents found that Smartphone controls them to the extent that they cannot control how and for how long they use it. From the researcher's point of view, this may happen because of the rapid change of the technology around the world that makes it small window for easier connection and entertainment.

This finding is in the line with Manna, Marak, Mukherjee& Banerjee, (2023), who study smart phone use and its perceived health effects among the adolescents attending Medical College and Hospital, Kolkata in India and reported that all of adolescents used Smartphone for the purposes of social media networks. Another study by Pandya, Christian& Patel, (2021) In Ahmed Abad, India among adolescents and young adults elicited the median daily duration of Smartphone usage to be 4 h.

As regards to the mean total scores and levels of Smartphone Addiction in each sex, It was found that more than three quarters of adolescents were Smartphone addict and had problematic Smartphone use and more than half of them were males. This finding is in the line with Manna et al., (2023), who reported that more than three quarters of adolescents were Smartphone addict and had problematic Smartphone use and more than half of them were males. This finding is in contrast with the study conducted by Patki, (2020). Who reported that (50%) of adolescents were Smartphone addict and had problematic Smartphone use, as a result of his study on Mobile phone usage and its perceived ill health effects: A cross-sectional study in Chennai, India.

Regarding the anthropometric measurements of the studied adolescents, it was found that more than three quarters of adolescents' BMI Percentiles fall in (95th-97th) zone and obesity category. This finding is in line with Haug et al., (2020) who found that (78%) of adolescents' BMI Percentiles fall in (95th-97th) zone and obesity category.

A statistically significant difference was observed between the group of adolescents who were addicted to Smartphone and the group of adolescents who were not; regarding the category in which the adolescents' body mass index falls (obesity category). This finding in agreement with Bozkurt, (2023) who found statistically significant difference was observed between the group of adolescents who were addicted to Smartphone and the group of adolescents who were not; regarding the category in which the adolescents' body mass index falls (obesity category).

As regards to the correlation between Smartphone Addiction Scale Short Version and BMI of the studied adolescents, a statistically significant and extremely positive correlation was found between Smartphone addiction and BMI ($p < 0.001^*$). This finding in agreement with Aghasi, Matinfar, Golzarand, Salari-Moghaddam, & Ebrahimpour-Koujan, (2019) ; Azizi, Abbasi& Aghaei, (2024) who studied "Internet use in relation to overweight and obesity: a systematic review and Meta-analysis of cross-sectional studies in Tekaband found a highly positive statistically significant correlation between Smartphone Addiction and BMI ($p < 0.001^*$).

Finally, there was a strong relation between obesity and Smartphone addiction or PSU, as Smartphone addiction resulted in an increase in the obesity rate among adolescents. So, it is important to develop strategies to reduce problematic Smartphone use in adolescents, through providing awareness programs for adolescents especially those suffering from obesity about the seriousness and consequences of Smartphone misuse and addiction on their health status.

A feasible alternative is the use of parental control applications on the Smartphones, which allows the reduction of hours of use. An additional measure is the generation of health education strategies, focused on adolescents, physical activity, that emphasize the short, medium and long-term negative effects of problematic Smartphone use. Also, the promotion of recreational activities, workshops, occupational therapies, aerobic and anaerobic exercise inside and outside home can be used. Within the family, it is important to set precise and reasonable times for the use of Smartphone or other digital technologies for adolescents.

Conclusion:

Based on the findings of this study, it can be concluded that there was a strong relation between obesity and Smartphone addiction or PSU, as Smartphone addiction resulted in an increase in the obesity rate among adolescents.

Recommendations:

- Awareness programs should be provided for adolescents especially those suffering from obesity about the seriousness and consequences of Smartphone misuse and addiction on their health status.
- Parents of obese adolescents should be educated about the need to set firm rules and specific, standardized times for using Smartphone through parental control applications.

- Awareness campaigns should be conducted at the community level to provide health education about Smartphone and its negative effects
- This study can be replicated on a larger sample size to be able to generalize the results.

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