Parent-Based Module for Preventing Gaming Disorder and Improving Self-Regulation Among Children

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Abstract

Background: Gaming disorder has become a significant health issue in pediatric care. While gaming is an important form of entertainment, excessive children's gaming may cause serious consequences for them and may be addicting. **Aim:** This study aimed to evaluate the effect of a parent-based module for preventing gaming disorder and improving self-regulation among children. **Design:** A quasi-experimental research design. **Setting:** This study was carried out in two governmental schools; Khadija Bent Khuaylid and Al-khulafaa Alrashidin preparatory schools, at El-Maasara Administration, Cairo Governorate, Egypt. **Sample:** A multi-stage random sample was used composed of 314 children and their parents. **Tools:** Three tools were used in this study: 1) A Structured Interviewing Questionnaire for children and their parents. 2) Game Addiction Screening Test. 3) Self-Regulation Questionnaire for Children. **Results:** The current study revealed that nearly one-tenth of parents and children had poor knowledge, which changed to slightly less than three-quarters and two-thirds of parents and children respectively having good knowledge after the intervention. As well, before the intervention, slightly less than three-quarters had high game addiction and nearly four-fifths had low self-regulation, while after intervention they changed to more than three-fifths had low game addiction and less than three-fifths of children had high self-regulation. A negative statistically significant correlation was detected between children's total knowledge scores and their total scores of the game addiction screening test as revealed by $r = -0.132$ and $P<0.044$. There was also a positive statistically significant correlation between children's total knowledge scores and their self-regulation ($r = 0.316$ at $p = 0.047$) after 3 months of module intervention. **Conclusion:** Implementation of the parent-based module had positive effects in improving knowledge scores of children and their parents. As well, children's game addiction scores were decreased and there was an improvement in children's self-regulation after the implementation of parent-based module. There were negative statistically significant correlations between children's game addiction with total knowledge and self-regulation scores. **Recommendations:** Parent-based module intervention guidelines on gaming disorder and self-regulation should be given to school-age children and their parents to prevent gaming disorder and improve their self-regulation, knowledge, and behaviors. Further research is needed to understand the underlying causes of video and internet gaming addiction and to explore effective preventative or intervention strategies for these children.

Keywords: Gaming disorder, Self-regulation, Parent-based module, Children

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Introduction

Gaming disorder is described in the eleventh revision of the International Classification of Diseases (ICD-11) as a pattern of gaming behavior ("digital-gaming" or "video-gaming") characterized by failed control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities and continuation of gaming despite the occurrence of negative consequences **(WHO, 2020)**.

There are many mental, physical, emotional, and social effects that may be experienced by children with a gaming disorder, these include Physical effects, which may include an increased risk for childhood obesity, headaches (eye strain), backaches, and the development of carpal tunnel syndrome (pain and numbness experienced in the wrists and hands due to overuse). Mental effects, like a decrease in mental performance in other activities as schoolwork, sleeping, and remembering obligations. Emotional effects, such as a detached feeling of self or society,

adopting a false identity associated with one's online character, or increased aggressive tendencies. Social effects, like greater isolation, reduced the desire to interact with family, friends, or acquaintances in a physical setting. **(Bullock, 2021)**.

If children's basic needs are deprived in reality, they may engage in compulsive gaming as an attempt to compensate for their unfulfilled needs in the game world. Children whose fundamental desires can't be sated in their family environment (e.g., authoritarian parenting, poor parent-child relations), may have a greater tendency to engage in obsessive gaming as a form of compensation. Over time, these children can become at risk for developing gaming disorder **(Li et al., 2019)**.

Self-regulation is the process through which individuals control and direct their thoughts, emotions, and behaviors to achieve goals. Self-regulation has been connected to many adaptive skills and desirable intellectual and physical outcomes across the lifespan. Self-regulation is vital for behavioral change regardless of the context, research shows that self-regulation is learned (**Frazier et al**.,**2021)**.

Self-regulation is a part of the social cognitive theory group, which includes three phases comprising self-monitoring, self-evaluation, and self-reinforcement. The four components part of self-regulation contain standards, monitoring, strength, and motivation. Self-regulation is an important personality process through which humans seek to exert manipulate over their thoughts, feelings, impulses, appetites, and task performances. An important process of self-regulation is monitoring information about one's existing state and comparing it with the desired goal **(Apisitwasana et al., 2018)**. Also, the process helps in the identification, assessment, and treatment of both behavioral excesses and deficits (**Edossa et al., 2017)**.

The process of self-regulation continues when children and adolescents develop the ability to think about what they are doing and react accordingly. In contrast, children and adolescents with poor self-regulation skills face more hazards of peer rejection, delinquency, social problems, and obesity. Young children want to increase self-regulation skills due to the strong influence these skills have on school readiness and building relationships with peers. Children who do not regulate their emotions and behaviors are more likely to engage in risk-taking and unhealthy behaviors. Therefore, children's poor self-regulation capacities have been shown to play a critical role in problematic gaming addiction **(Apisitwasana et al., 2018)**.

Most parents are not prepared or trained to deal with the challenges of digital parenting and are striving to clarify the ambiguity regarding the overall impacts on their children and ways to handle them. Promotion of a systemic method to inhibit screen time problems is timely and shows a collaboration among the 3 most important stakeholders children, parents, and schools led by public policy implementation with the collaboration of academic and non-governmental institutions to support evidence-based preventive efforts for problematic use of social media and gaming **(Throuvala et al., 2021)**.

Parent-based intervention is developed to empower parents with the knowledge and skills to cultivate positive parenting and family environments, which serve as protective factors against gaming disorder in children. Positive parenting should be characterized by a capacity to promote the fulfillment of three basic psychological needs, the need for autonomy, relatedness, and competence. If children cannot fulfill their basic needs in one social environment, children may turn to other social environments to seek need gratification. The video game environment contains elements that can fulfill a player's basic needs, which makes gaming intrinsically motivating **(Li et al., 2019)**.

Education about the impacts of gaming addiction is critical for all children, not just those who are gaming addicted. School nurses should provide education to game-addicted children and families as well as focus on the prevention of gaming addiction in unaffected children. This includes sharing information about gaming addiction, the potential hazards of

overexposure to technology and content-appropriate games, and limiting screen access times to less than 1 to 2 hours a day as recommended by the American Academy of Pediatrics **(Gentile et al., 2017)**.

Other educational strategies aimed at prevention that may be helpful to share with parents include limiting technology access in bedrooms, denying access to technology for a half-hour prior to bedtime, and initiating parental content controls on devices **(Johnson & Edwards, 2020)**.

Nurses play an important role in the prevention of gaming disorder by disseminating information among families about the risk of excessive screen time or gaming and how to prevent it; be vigilant about the possibility of excessive screen time or gaming during this period and include them in their assessments, particularly for children and adolescents; include, whenever possible, online psychological support and counseling sessions for parents and their children with gaming and gambling disorders; inform parents about how to detect, respond and if necessary, report harmful online content and provide them with information about available support **(WHO, 2021)**.

Significance of the study

Video gaming is a favorite hobby for many boys and girls. A survey estimated that as high as 91% of children and adolescents aged between 2 and 17 years play video games. The compulsive or addictive gameplay is a widespread concern among parents, teachers, policymakers, and the mass media. Frequent gaming predisposes children to risks of gaming disorder, but few studies have examined what can be done to help children gain better control over their gaming behavior and prevent them from gaming addiction **(Li et al., 2019)**.

Referring to online statistics, game applications are the most popular among smartphone apps, and the revenue in the online games segment has increased during the last years and especially months **(Statista, 2020)**. A recent online survey by the Global Web Index (GWI) on the effects of the COVID-19 pandemic investigating 17,143 adolescent and adult internet users revealed a worldwide increase in smartphone usage and digital media consumption, including games, especially in young users **(GWI, 2020)**.

The prevention of problematic video game playing has received much less attention in many countries **(King et al., 2017)**. Gaming disorder problems can have important mental, physical, emotional, and social consequences' effects experienced by children and their families. Hopefully, this study would provide a module intervention for preventing gaming disorder and improving self-regulation among school-age children.

Operational definitions

Gaming disorder is the obsessive and compulsive overuse of internet games and video games.

Self-regulation is the ability to control behaviors and manage thoughts and emotions in appropriate ways.

Aim of the study

This study aimed to evaluate the effect of a parent-based module for preventing gaming disorder and improving self-regulation among children.

Research hypotheses

H_1: There will be a significant improvement in the mean knowledge scores of parents and their children after the implementation of a parent-based module regarding the prevention of gaming disorder.

H_2: Parent-based module will have a positive effect on preventing gaming disorder and improving self-regulation among school-aged children.

Subjects and methods

1-Technical Design

1.1 Research Design:

A quasi-experimental pre-test and post-test research design was utilized in this study.

1.2 Research setting:

The study was carried out in two governmental preparatory schools namely, Khadija Bent Khuaylid and Al-khulafaa Alrashidin affiliated to El-Maasara Administration, Cairo Governorate, Egypt.

1.3 Sampling

Sample technique: A multi-stage random sample was used for the selection of preparatory schools according to the following stages:

First stage: Two governmental preparatory schools in El-Maasara were chosen randomly for the conduction of the study, Abobakr Elsedeak, and Anas Ben Malek preparatory schools.

Second stage: One class from the first, second, and third grades was selected randomly from each school. The total classes included in the study were 6 classes.

Third stage: All school children in the selected classrooms were included in the study, with the following inclusion criteria: Both genders, their ages ranged between 11-15 years. Children with serious medical conditions or experiencing cognitive impairment and absent children on the first day of data collection were excluded from the study.

Sample size:

Based on data from the literature by **Apisitwasana et al, (2018)**, considering a level of significance of 5%, and power of study of 80%, the sample size was calculated using the following formula **Charan & Biswas, (2013)**:

$$n = \frac{(Z\alpha/2 + Z\beta)^2 \times 2(SD)^2}{d^2}$$

where, SD = standard deviation obtained from the previous study; $Z_{\alpha/2}$, for 5% this is 1.96; Z_{β}, for 80% this is 0.84; and d is the expected mean difference. Therefore,

$$n = \frac{(1.96 + 0.84)^2 \times 2(1.1)^2}{(2.46)^2} = 313.5$$

Based on the above formula, the sample size required for the study is 314 children and their parents.

1.4 Tools and Techniques of Data Collection

Data were collected using the following tools:

Tool I: A Structured Interviewing Questionnaire

It was designed by the researchers in simple Arabic language after reviewing current related literature. It comprised the following parts:

Part (1): Characteristics of the studied children as; age, gender, and educational grade.

Part (2): Characteristics of parents, such as; age, gender, level of education, occupation, number of family members, parenting style, type of family, residence, have devices at home, and internet access at home.

Part (3): Baseline characteristics of studied children's gaming behaviors as; area allowed to use devices at home, how to play a game, type of games that are usually played, where games are played, number of daily games played per week, and gaming time.

Part (4): Concerned with studied children and their parents' knowledge regarding gaming disorder and self-regulation: Questionnaires developed by the researchers based on **Kajonboon, (2008)**. It consisted of 12 open-ended questions to assess children and their parents' knowledge regarding gaming disorder (as; what is gaming disorder? mention types of games? what are the consequences of gaming? list gaming addiction behavior? how to play games? and avoiding addiction to gaming? what is the time limit for playing games per day? how to assess gaming addiction and how to manage gaming disorder and addiction) and self-regulation questionnaire (as; what is self-regulation mean, why self-regulation is necessary, how can develop self-regulation? and how to set goals in the short and long term for behavior?).

Scoring system for knowledge:

Knowledge obtained from the studied children and their parents was checked with a model key answer. The open question scored as the following: a correct answer takes "two", while the incomplete answer takes "one" and a wrong answer or don't know takes "zero". The total score is 24 was converted into percentages and interpreted as follows: < 50% is considered poor, score ranged from 0 - < 12, while 50% - < 75% is considered fair, score ranged from 12 - < 18 and ≥ 75% is considered good, the score ranged from 18 - ≤ 24.

Tool II: Game Addiction Screening Test (GAST)

This is the standard tool developed by **Pornnoppadol et al., (2014)** it is used to assess gaming addiction behavior. This tool consisted of 16 items, for example, I always play games until I forget my time; I am always discontent when someone tells me to stop gaming. Each item had a 4-point rating scale ranging from "Not at all" to "Yes" (1-4 points).

Scoring system

Total scores varied from 16 to 64 points. High scores meant children were more addicted to games ranging from 32 - ≤ 64, while lower scores meant children were less addicted to games ranging from 16 - < 32.

Tool III: Self-Regulation Questionnaire for Children

It includes 31 items for reported self-regulation, developed by **Carey et al., (2004)** to measure the ability to regulate behavior to achieve one's goals. The studied children were asked to complete 31 items of the self-regulation report. Each item is answered by using a 5-point Likert scale, that was rated from 1- 5, with (1) strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. Examples of items include the following: I usually keep track of my progress toward my goals, I don't seem to learn from my mistakes, I have a lot of willpower, I am able to resist temptation and I set goals for myself.

Scoring system

The total score ranged from 31 to 155, which was categorized into low self-regulation 31- < 78 and high self-regulation 78 - ≤ 155.

Operational Design

Preparatory phase

This phase included reviewing the available literature related to gaming disorders and self-regulation to cover various aspects of the research problem using books, articles, magazines, and internet searches to develop the study tools for data collection.

Validity of the tools

Tools were reviewed and tested for validity by 3 experts in Pediatric Nursing except tool II. Modifications were done accordingly on the tools to ascertain relevance and completeness.

Reliability of the tools

Reliability was applied by the researchers for testing the internal consistency of the tools, by administering the same tools to the same subjects under similar conditions on one or more occasions. The Cronbach's alpha value of the reliability (internal consistency) of the total parents' knowledge was 0.876, the total children's knowledge was 0.856, and the self-regulation was 0.896.

Pilot study

A pilot study was carried out on 10% of the study sample to evaluate tools for clarity, and applicability, and to estimate the time required for filling in the tools before starting the actual data collection. Based on the results, the necessary modifications and rearrangements to the study tools were done. Children and their parents who participated in the pilot study were excluded from the main study sample.

Ethical considerations

Verbal consent was obtained from the studied children and their parents to participate in the study. Participants were assured that all collected data taken from them would be treated confidentially and used for the research purpose and for their benefit only. Participants' anonymity, confidentiality, privacy, safety, and protection were secured.

Field work

Data collection took 6 months, the actual field work started on the first of October to the end of March, where the researchers were available in the study settings twice a week from 9.00 a.m. to 12.00 noon. The researchers introduced themselves and explained the aim of the study to the studied children and their parents before their enrollment in the study. After taking consent, the studied children and their parents were interviewed in which the previously mentioned study tools were administered before the training sessions began. The answers of the questionnaire were marked by the researchers; 15-20 minutes were needed to complete the questionnaire.

The parent-based module intervention was developed to empower parents with the knowledge, and skills to cultivate positive parenting and family environments, which serve

as protective factors against gaming disorder in children. The intervention module was covering topics of self-regulation, and positive gaming motivations, which reported reduced excessive gaming.

Then, the studied children and their parents received training sessions on gaming disorder prevention for children. All the training sessions were held in an activity room, in the school, where the participants were recruited. Prior to training, all parents who agreed to participate were given information on the study.

Intervention module

The intervention module was designed by researchers to satisfy the actual need of the studied children and their parents, for preventing gaming disorders and improving self-regulation among school-aged children, the intervention was constructed in four sessions. The intervention module comprised three modules: parental monitoring, parental care, and psychoeducation.

The first module of the parent-based module intervention focuses on parental monitoring, which has been found to be a protective factor for gaming addiction. By paying close attention to when, what, and with whom children game, parents can intervene as soon as symptoms of gaming disorders arise. To strengthen this protection factor, the parental monitoring module aims to explain how parents can stay knowledgeable about their children's gaming activities without depriving their needs.

In the parental monitoring module, parents were shown how to keep track of the time their children spent on gaming (e.g., by using in-game applications) and the content they were exposed to (e.g., by researching on game-rating websites). Monitoring of children's social interactions in games, to facilitate the practice of such monitoring, a list of questions was provided so that parents could use them to initiate conversations in-game friendships with their children. More importantly, parents were guided to design a system that would encourage goal setting and record keeping simultaneously. They could use the system to have open discussions about monitoring activities with their children, which should minimize children's perceptions of over-controlling parenting.

The second module revolves around parental care, to alleviate symptoms of gaming addictions that consist elements of parental care that can gratify relatedness needs. These elements include (1) Expressions of warmth, (2) Responsiveness to needs, and (3) Instilling of shared positive emotions. For the 1st element, parents were familiarized with how to express warmth to their children through means such as adopting more open and less closed postures. For the 2nd element, parents learned how to discover signs of distress in children and practiced through role-playing how to respond to such signs using skills of active listening. For the final element, parents see a free play video to gain ideas for leisure activities.

The third module focuses on psychoeducation, the module is complementary to the parental monitoring and parental care modules. This module seeks to educate parents and their children on the behaviors, consequences of gaming, and self-regulation. Having a better understanding of video gaming, acquired knowledge about children's motives behind gaming, and potential negative effects of play such as gaming disorder and aggression, parents can offer to need specific alternative activities and structures surrounding those activities. This should help children to develop a sense of competence through greater knowledge of gaming, parents can provide better gaming-specific parenting to their children.

In the psycho-education module, parents were provided with information on popular types of video games and a list of channels to discover more about the game's content. For example, there have been demonstrations on how to check whether or not a specific game contained violent content. Parents were encouraged to discuss with their children the expectations and rewards pertaining to the alternative activities.

Instructions in the psycho-education module included skill demonstrations, and video shows, followed by group discussions in

which parents were given chance to ask questions and exchange opinions.

Evaluation of the module

Assessing the effects of the module on children's levels of gaming disorder after three months of module intervention. After attending the module intervention, children and their parents were contacted again after three months to complete the post-module intervention questionnaire using the same questionnaires that were administered before the module intervention through a telephone or face-to-face interview in which the participants answered all the questions.

Administrative design:

The present study was carried out after taking official permissions from the directors of the selected schools to collect the data, and the aim and expected outcomes of the study were explained clearly.

Statistical Analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS), for windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ± standard deviation (SD). Categorical data were expressed in numbers and percentages. Independent sample student T-Test was used for comparison between two variables with continuous data. The Chi-square test was used for the comparison of variables with categorical data. The correlation coefficient test was used to test for correlations between two variables with continuous data. The reliability (internal consistency) test for the questionnaires used in the study, was calculated. Statistical significance was set at $p<0.05$.

Results:

Table (1): shows that more than half (52.2%) of studied children had 11-<13 years, while less than half (47.8%) had 13 -15 years. Regarding gender, slightly more than three-fifths (60.5%) of studied children were boys, while less than two-fifths (39.5%) were girls. As well, the same table reveals that more than half (52.2%) of studied children were first born, more than one-third (34.6%) second, less than one-tenth (9.5%) were third born and a minority (3.5%) were fourth or more born. Concerning studied children's educational grades, more than one-third (35.0%) were in the first grade, while the remained studied children (32.8% &32.2%) representing less than two-thirds were in the second and third grades respectively.

Table (2): reveals that the mean age of fathers and mothers was 38.3 ±5.9 and 35.5 ±7.3 respectively. As for age 38.6% of fathers and 37.0% of the mothers were in the age group of 30 - < 40 years. Concerning the level of father education, more than half (52.3%) had higher education and more than three-fifths (61.5%) of mothers had higher education. As regards fathers' employment status, 56.8% were professional working, while 70.4% of mothers were housewives. Less than half (47.1%) of the studied children's family size was 5 members and most of them (93.0%) belonged to a nuclear family. As regards the parenting style slightly more than three-fifths (62.1%) are permissive. As well, less than three-quarters (71%) reside in urban areas. Most (96.2%) of the studied children have devices at home (as computers, tablets, and phones), and 89.8% have internet access at home.

Table (3): Represents characteristics of studied children's gaming behavior at pre/post-intervention. The results showed that at pre-module intervention less than three-fifths (58.9%) used devices at home in the bedroom which changed after the intervention to less than one-fifth (17.8%) in the bedroom. As well, more than three-fifths (62.7%) used devices in the living room, at post-intervention compared to 18.5% at pre. The remaining studied children (19.4%) still used devices everywhere. There was a highly statistically significant difference between pre-and post-intervention (X^2 = 145.575 at $p < 0.001$).

The same table (3) indicates that nearly three-fifths (62.7%) play games online at pre-intervention which decreased to more than one-third (36%) after the intervention. Regarding the type of games that are usually played, slightly less than three-fifths (59.6%), play fighting games, and the remaining 24.2% and 16.2% play online and adventure games respectively at pre-intervention which changed to slightly less

than one-third (32.2%) after intervention for playing fighting games.

As regards the number of daily games played per week, the result in the table (3) reports also that the majority of studied children (86.3%) play games for equal or more than five days per week which decreased to less than one-fifth (17.2%) after the intervention. There was a highly statistically significant difference (X^2 = 307.698 at p <0.001).

Regarding gaming time (hours/day) table (3) presents that slightly less than three-quarters (74.5%) of studied children play games equal or more than 4 hours/day pre-intervention which decreased to slightly more than one-fifth (20.1%) at post-intervention. There was a highly statistically significant difference (X^2 = 200.076 at p <0.001).

Figure (1): illustrates that slightly less than three-quarters (74.5%) of parents had good knowledge after 3 months of parent-based module intervention compared to slightly more than one-tenth (10.5%) of them before intervention regarding gaming disorder and self-regulation.

Figure (2): shows that slightly less than two-thirds (65.3%) of children had good knowledge after 3 months of parent-based module intervention compared to 9.9% of them before the intervention.

Figure (3): clarifies that more than three-fifths (62.1%) of children had low scores of game addiction after 3 months of module intervention compared to more than one-quarter (26.4%) of them before intervention.

Figure (4): reveals that less than three-fifths (56.4%) of children had high self-regulation score and more than two-fifths (43.6%) had low self-regulation after 3 months of module intervention, while one-fifth (20.1%) of them had high self-regulation score before intervention.

Table (4): shows a negative statistically significant correlation between children's total knowledge score and their total score of the game addiction screening test as revealed by r = -0.132 at P<0.044. There was also a positive statistically significant correlation between children's total knowledge score and their self-regulation as r = 0.316 at p = 0.047 after 3 months of module intervention.

Table (5): reveals a negative statistically significant correlation between children's game addiction screening test and their self-regulation score as revealed by r = -0.302 at P=0.042 after 3 months of module intervention.

Table (1): Characteristics of Studied Children (n = 314)

Variables	No	%
Age (years)		
11 - < 13	164	52.2
13 - 15	150	47.8
Mean ± SD	12.4±1.3	
Gender		
Boys	190	60.5
Girls	124	39.5
Birth order		
First born	164	52.2
Second born	109	34.6
Third born	30	9.5
Fourth or more born	11	3.5
Educational Grade		
1st	110	35.0
2nd	103	32.8
3rd	101	32.2

Table (2): Characteristics of Studied Parents (n = 314)

Variables	No.	%
Characteristics of Father (n=44)		
Age of father (years)		
20 – < 30	12	27.3
30 – < 40	17	38.6
≥ 40	15	34.1
Mean ± SD	38.3±5.9	
Father's education		
Basic education	8	18.2
Secondary education	13	29.5
Higher education	23	52.3
Father's occupation		
Employee	7	15.9
Worker	9	20.5
Professional worker	25	56.8
Not working	3	6.8
Characteristics of Mother (n=270)		
Age of mothers (years)		
20 – <30	84	31.1
30 – <40	100	37.0
≥ 40	86	31.9
Mean ± SD	35.5±7.3	
Mother's education		
Basic education	28	10.4
Secondary education	76	28.1
Higher education	166	61.5
Mother's occupation		
Housewife	190	70.4
Employed	80	29.6
Social Characteristics		
Number of family members		
Three	34	10.8
Four	86	27.4
Five	148	47.1
> five	46	14.6
Type of family		
Nuclear	292	93.0
Single parenting	22	7.0
Parenting style		
Permissive	195	62.1
Authoritarian	92	29.3
Authoritative	21	6.7
Uninvolved	6	1.9
Residence		
Rural	91	29.0
Urban	223	71.0
Have devices at home (as a computer, tablet, phone)		
Yes	302	96.2
No	12	3.8
Internet access at home		
Yes	282	89.8
No	32	10.2

Table (3): Baseline Characteristics of Studied Children's Gaming Behavior (n =314)

Variables	Pre-Intervention		Post-Intervention		Chi-Square	
	No	%	No	%	X^2	P
The area allowed to use devices at home						
Living room	58	18.5	197	62.7		
Bedroom	185	58.9	56	17.8		
Everywhere	71	22.6	61	19.4	145.575	<0.001**
How are you playing the games?						
Online games	197	62.7	113	36.0		
Offline games	8	2.5	125	39.8		
Online and offline	109	34.7	76	24.2	131.573	<0.001**
Type of games that are usually played						
Line games	76	24.2	125	39.8		
Fighting games	187	59.6	101	32.2		
Adventure games	51	16.2	88	28.0	47.474	<0.001**
Where games are played						
At home	288	91.7	307	97.8		
Outside the home	26	8.3	7	2.2	11.546	<0.001**
Number of daily games played per week						
< 3	17	5.4	182	58.0		
3 – 4	26	8.3	78	24.8		
≥ 5	271	86.3	54	17.2	307.698	<0.001**
Mean ± SD	4.8 ±1.4		3.6 ±1.2		11.532	<0.001**
Gaming time (hours/day)						
< 2	28	8.9	156	49.7		
2 – 3	52	16.6	95	30.3		
≥ 4	234	74.5	63	20.1	200.076	<0.001**
Mean ± SD	4.1 ±1.2		2.3 ±1.1		19.593	<0.001**

Figure (1): Total Parents' Knowledge Score Regarding Gaming Disorder and Self-Regulation before and 3 Months after Parent-Based Module Intervention (n=314).

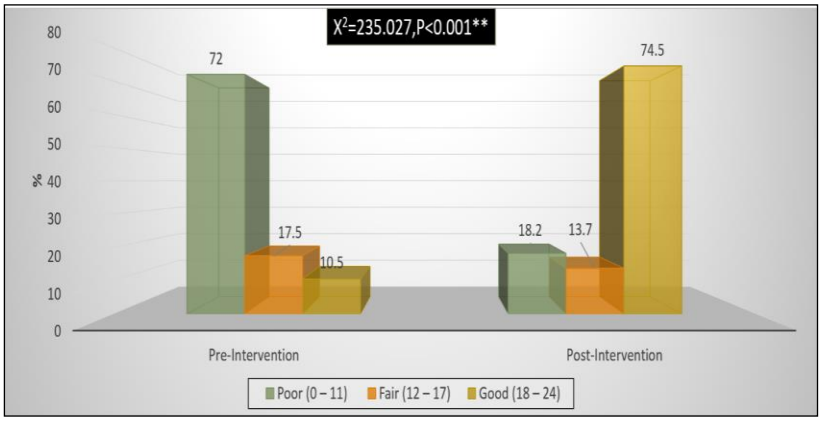

Figure (2): Total Children's Knowledge Score Regarding Gaming Disorder and Self-Regulation before and 3 Months after Parent-Based Module Intervention (n=314).

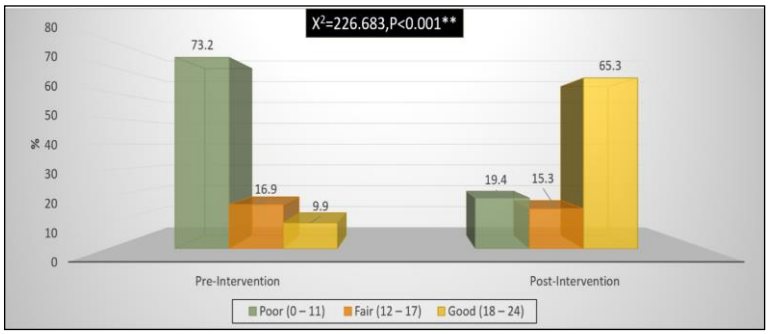

Figure (3): Total Children's Game Addiction Screening Test Score before and 3 Months after Module Intervention (n=314).

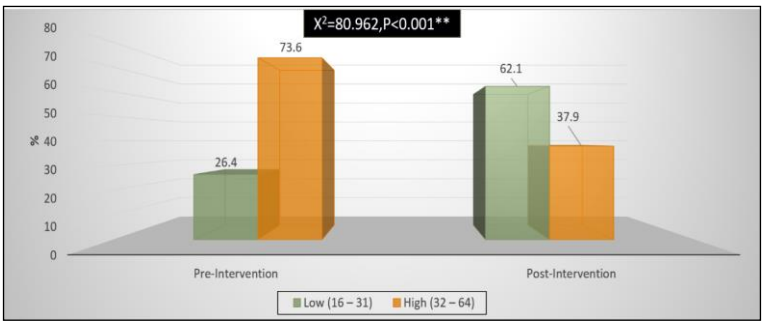

Figure (4): Total Children's Self-Regulation Score before and 3 Months after Module Intervention (n=314).

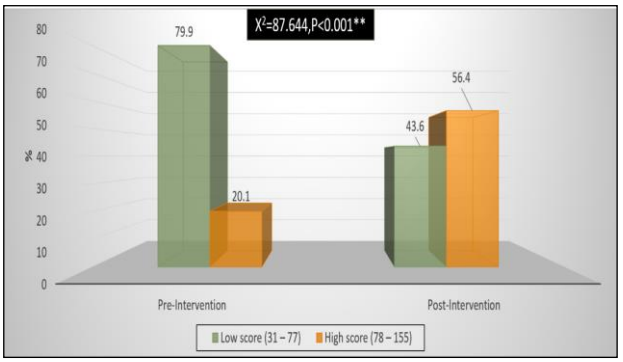

Table (4): Correlation between Studied Children's Total Knowledge Score with Game Addiction Screening Test and Self-Regulation Scores after 3 Months of Module Intervention.

Items	Total knowledge score	
	r	P
Game Addiction Screening Test (GAST)	-0.132	0.044*
Self-Regulation	0.316	0.047*

Table (5): Correlation between Children's Game Addiction Screening Test and Self-Regulation Scores after 3 Months of Module Intervention.

Items	Game Addiction Screening Test	
	r	P
Self-Regulation	-0.302	0.042*

Discussion

Psychosocial problems arising from excessive gaming are a public health issue across the developed world. The most serious form, of problematic gaming is recognized as gaming disorder (GD). In some regions, however, there is relatively little information and guidelines, or support services, to address excessive and problematic gaming **Stevens et al., (2021)**.

Frequent gaming predisposes children to risks of gaming disorder **Wang et al., (2019)**. Few studies have examined what can be done to help children gain better control over their gaming behavior and prevent them from gaming addiction **Li et al., (2019)**. The overarching objective of this study is to address this gap by designing a parent-based module for preventing gaming disorders and improving self-regulation among school-aged children.

Regarding characteristics of the studied children, the present study findings revealed that more than half of the studied children were in the age range from 11 -< 13 years with a Mean ± SD of 12.4 ±1.3. This result is nearly similar to that of the study carried out by **Li et al., (2019)**, whose study entitled "Development and validation of a parent-based program for preventing gaming disorder: The game over intervention" in Hong Kong, reported that the Mean of child's age was 10.22 and SD was 1.01 in the intervention group, and the Mean ± SD was 9.97 ±.95 in the control group.

However, this study result was inconsistent with that of **Navaneetham and Chandran (2018)**, whose study was entitled "Video game use among school children and its impact on the study habits" in India, who reported that the age of the respondents varies from 13 years to 16 years and about 57% of the adolescents are aging 13 years old. This may be related to different studied students' samples, areas, environmental characteristics, and variable classification.

Video gaming is a favorite pastime for many boys and girls. Regarding gender, the present study result indicated that slightly more than three-fifths of studied children were boys and slightly less than two-fifths were girls. This result is consistent with that of **Mihara and Higuchi (2017)**, whose study entitled "Cross-sectional and longitudinal epidemiological studies of internet gaming disorder: A systematic review of the literature" in Yokosuka, Japan, stated that video game use, the prevalence of internet gaming disorder (IGD) and rise of IGD are all higher among boys**.** As well, this result is congruent with that of **Li et al., (2019)**, who found that less than two-thirds (63.2%) of the studied children were boys and more than one-third (36.8%) were girls.

However, the present study results are incongruent with those of **Islam et al., (2020)**, who studied the "Effect of internet use and electronic game-play on academic performance of Australian children", and reported that girls had a more addictive tendency to internet/gameplay in comparison to boys. This increase in the proportion of boys might be due to that the girls generally had a better understanding of the potential dangers of excessive gaming.

Regarding birth order, the results of the current study revealed that more than half of the studied children were first born, while more than one-third were second born, less than one-tenth were third and a majority were fourth or more born. These results disagree with those of **Navaneetham and Chandran (2018)**, which showed that less than half (47%) of the respondents were first born, 11% were middle born, and 29% were the last child.

Considering educational grade, the result of the present study revealed that, more than one-third of children under study are in the first grade, while near percentages of less than one-third are in the second and third grades of preparatory schools. This result is inconsistent with that of **Apisitwasana et al., (2018)**, who studied "Effectiveness of school- and family-based interventions to prevent gaming addiction among grades 4–5 students in Bangkok, Thailand" reported that more than half (53.6%) are in the 4th grade, this may be due to changes in their studied sample personal and environmental characteristics, sample size, and study period.

Regarding fathers' and mothers' ages less than two-fifths of fathers and mothers were in the age group of 30 - < 40 years. This result is inconsistent with that of a study carried out by **Navaneetham and Chandran (2018)**, who found that less than half (46.5%) of the fathers belonged to the age group of 35–45 years and most of the mothers (80%) belonged to the age category of (35–40). This may be attributed to changes in the studied sample's personal and environmental characteristics.

Concerning the level of education, the current study results revealed that more than half of fathers, and slightly more than three-fifths of mothers had higher education. This result is congruent with that of a study carried out by **Apisitwasana et al., (2018)**, **who** documented that slightly more than three-fifths (62.9%) of mothers and more than half (54.9%) of fathers had bachelor's degree or higher education. This may be due to increased awareness about the importance of education, belief, and custom in the community.

Considering employment status, the result of the present study revealed that, less than three-fifths of fathers were professional workers, while less than three-quarters of mothers were housewives. This result is to some extent consistent with that of **Navaneetham and Chandran (2018)**, who reported that slightly less than two-thirds (65.5%) of the mothers were homemakers. As well, this result is incongruent with that of **Apisitwasana et al., (2018)**, who reported that less than two-fifth of fathers (37.1%) and mothers (39.1%) were in government careers. This may be due to a lack of opportunities for employment and the culture of the community.

The current study findings indicated that less than half of the studied children's family size was five members and most of them belong to a nuclear family. As well, this study's results agreed with those of a study carried out by **Navaneetham and Chandran (2018)**, which stated that the majority of the respondents (86%) belonged to a nuclear family, whereas the majority (88%) of respondents' family size was <5 members.

As regards parenting style, the present study results revealed that less than two-thirds are permissive, and less than three-quarters reside in urban areas. These results are inconsistent with that of **Apisitwasana et al., (2018)**, who reported that slightly more than two-thirds (66.6%) in intervention and (61.6%) in control groups were authoritarian.

Most of the studied children have devices at home (as computers, tablets, and phones) and the majority of them have internet access at home. These results are to some extent consistent with those of **Apisitwasana et al., (2018)**, which mentioned that majority of their sample have devices at home and documented that more than half (54.5%) were internet users. Their primary reason for using the internet was to play games as clarified by slightly less than two-thirds (65.4%). In addition, **Islam et al., (2020)**, reported that most (97%) of Australian households accessed the internet at home.

Excessive use of online and video games has become a common habit. Regarding characteristics of studied children's gaming behavior at pre/post module intervention, the results showed that at pre-module intervention less than three-fifths used devices at home in the bedroom which changed after module intervention to less than one-fifth use devices in the bedroom and more than three-fifths in the living room. There was a highly statistically significant difference between pre/post-intervention. This result is incongruent with that of **Apisitwasana et al. (2018)**, who documented

that less than two-thirds (64.7%) mentioned that they played games at net cafes.

These previous results are consistent with those of **Islam et al., (2020)**, who highlighted that parents restrict access to screens (e.g., Internet and electronic games), in children's bedrooms. This could be attributed to the increased availability of computers/smartphones and the internet in the bedroom before the intervention, while after intervention parents restricted devices and the internet in the bedroom. Also, this may be related to the effect of the intervention on children and parents.

This study result indicates that, more than three-fifths of studied children play games online which decreased to less than two-fifths after parent-based module intervention. Regarding the type of games that are usually played, less than three-fifths play fighting games, and the remaining play line and adventure games pre-intervention, which changed to slightly less than one-third after intervention play fighting games. This result agrees with that of **Apisitwasana et al., (2018)**, which reported that nearly three-fifths (62.6%) played games online. In addition, **Li et al., (2019)**, stated that, parents participating in a program for preventing gaming disorder reported a reduction in their children's gaming time, level of exposure to violent video games, and symptoms of gaming disorder, three months after taking part in the GOI. This may be attributed to that after-intervention parents were helping their children develop self-regulation skills at home and decreasing online use. As well, the parent-based module intervention helped children to turn to other social environments to seek need gratification.

As regards the number of daily games played per week the study result revealed that the majority of studied children play games more than five days per week, which decreased to less than one-fifth after parent-based module intervention and there was a highly statistically significant difference between before and after 3 months parent-based module intervention.

This study result agrees with that of **Bonnaire et al., (2019)**, whose study entitled "Effects of a prevention intervention concerning screens, and video games in middle-school students: Influences on beliefs and use" conducted in Parisian Suburban schools which reported that time spent on the internet and video games during the week and the weekend were significantly lower in the post-prevention intervention in the study group, while an increase was higher in the control group. Additionally, **Stevens et al., (2021)**, who in a very recent study entitled "Prevention strategies to address problematic gaming: An evaluation of strategy support among habitual and problem gamers" conducted in Australia, reported that, children's gaming time and exposure to violent video games differed by condition from Time 2 (one week after intervention) to Time 3 (three months after intervention). In this period, both intervention goals continued to decrease in the intervention condition, but, in contrast, they increased in the control condition.

This may be due to the intervention module being more capable of regulating parents' and their children's thoughts, emotions, and behaviors to achieve long-term goals. This result could suggest a better ability to organize daily time during the week among children. As well, parental monitoring and care, and reinforcement of alternatives help to satisfy children's basic needs. Hence, children were less distressed and less likely to play video games.

Playing video and internet games is a widespread activity among young children, and a substantial proportion of their learning time is spent on this activity **Navaneetham and Chandran (2018)**, The result of the present study revealed that slightly less than three-quarters of the studied children play games more than 4 hours/day, which decreased to slightly more than one-fifth after parent-based module intervention and there was a highly statistically significant difference between before and after parent-based module intervention. This result is consistent with that of **Navaneetham and Chandran (2018)**, which reported that, the results on the time spent on video games indicate that less than one-fifth

(19%) of children were playing video games >3 hrs.; followed by less than one-third (31%) of the students are playing 1–2 hrs.; and less than quartile (23.5%) of students are playing for 30 min regularly. In addition, **Islam et al., (2020)**, stated that less than three quarters (70%) of the sample of adolescents aged 11–17 spent more than 2 hrs. per day on the internet, and less than one-third (30%) spent more than 2-hrs. on electronic gaming in a day.

These previous results could be attributed to the increased availability of computers/smartphones and the internet among students, which could suggest a better ability to organize daily time among students due to the effect of the parent-based module intervention. As well, parents respond to intervention and restrict electronic games, monitor children using video games, share video hours with their children, and act as role models by reducing their own video time.

In relation to the total score of children's and their parents' knowledge regarding gaming disorder and self-regulation, the result of the current study clarified that there was a marked improvement in children's and their parents' knowledge after the implementation of parent-based module intervention in comparison to before the intervention. This result was consistent with that of the study conducted by **Apisitwasana et al., (2018)**, who found that there was a statistically significant difference between the intervention and control groups in gaming knowledge at the post-intervention assessment ($P < 0.001$). Moreover, **Bender et al., (2020)**, whose study entitled "Gaming disorder in children and adolescents: Risk factors and preventive approaches" found that the most important preventive approaches are to inform parents about problematic gaming specifically, about risk factors and negative consequences, parents should learn more about their children's gaming behavior, set up sensible rules about video games, and monitor for signs of problematic gaming. This may be related to the effect of implementation of a parent-based module in improving parents' knowledge about this issue.

Hence, this study hypothesis (H_1), which stated that, there will be a significant improvement in mean knowledge scores of parents and their children after the implementation of a parent-based module regarding the prevention of gaming disorder was justified.

Concerning children's game addiction screening, the finding of the present study dedicated that, the total children's GAST scores decreased after module intervention from baseline scores. This result is supported by the findings of the study carried out by **Apisitwasana et al., (2018)**, who reported that the GAST scores at the post-intervention assessment and at the 3-month follow-up also showed statistically significant differences between the intervention and the control groups ($P < 0.001$). however, these results disagreed with those of **Krossbakken et al., (2018)**, whose study entitled "The effectiveness of a parental guide for the prevention of problematic video gaming in children: A public health randomized controlled intervention study" carried out in Norway**,** found that there was no evidence for the effectiveness of the psycho-educational parental guide on preventing problematic video gaming in children. Interestingly, the current study improvement could be attributed to the effectiveness of the parent-based module intervention which empowered parents with the knowledge, and skills that served as protective factors against gaming addiction in children and reduced excessive gaming. As well, it involved children, and parents to strengthen parent-child communication, promote family harmony, help parents recognize the problems of their children, and find out their role in children's gaming behavior as early as possible.

The results of the present study revealed that there was an improvement in children's self-regulation after the implementation of parent-based module intervention in comparison to before the intervention. This study is parallel to the study done by **Chung & Seomun (2019)**, whose study entitled "The effect of internet addiction prevention program on adolescents' self-regulation: A systematic review and meta-analysis", which revealed that, the effects of

self-regulation on the internet addiction prevention program were statistically significant in both elementary and middle and high school students. Moreover, these findings agree with those of the study done by **Yang & Kim, (2018)**, who studied the "Effects of a prevention program for internet addiction among middle school students in South Korea", and stated that, the experimental group, which participated in the self-regulatory efficacy improvement program, had significantly higher self-control scores at posttest than did the control group, thereby indicating that the program was effective. This could be attributed to that children were using games as a coping strategy to cope with difficult situations or feelings before the intervention, while, after implementing the parent-based module intervention that covers topics of self-regulation, and positive gaming motivations, children's self-control developed. Additionally, if parents manage to monitor and regulate their children's video game use, then children are able to use video games as a pastime to be enjoyed alongside other activities in real life not a substitute for real life.

Regarding the correlation between children's knowledge with game addiction screening test and self-regulation scores, the current study result revealed that there was an improvement in children's game addiction screening test and self-regulation scores after parent-based module implementation. This finding goes with **González-Bueso et al., (2018)**, whose study entitled "Internet gaming disorder in adolescents: Personality, psychopathology, and evaluation of a psychological intervention combined with parent psychoeducation" emphasized that the cognitive behavioral therapy approach is useful in reducing the direct symptoms related to addiction and other comorbid symptomatology**.** This finding could be explained as, a parent-based module that helps children to gain more knowledge about gaming addiction and its effects that enhance self-regulation promote confidence in refusing game playing, as well as provide information about how to regulate themselves, the types of games they can play, suitable duration to play games. All of these would help children prevent gaming addiction behavior.

The current study revealed that there was a negative statistically significant correlation between children's total game addiction screening test (GAST) scores and self-regulation after parent-based module implementation. This result is inconsistent with that of the study conducted by **Wartberg et al. (2020)**, about "An empirical exploration of longitudinal predictors for problematic internet use and problematic gaming behavior", which reported that improving core developmental factors such as emotional regulation and family functioning will likely also have beneficial effects on other factors associated with GD in childhood and adolescence, such as self-esteem and regulation. This may be related to good self-regulation which helped children understand the meaning of time and regulate their activities in addition after parent-based module implementation, children understand that excessive gaming is usefulness.

The above-mentioned results proved this study hypothesis (H_2), which revealed that the parent-based module will positively prevent gaming disorders and improve self-regulation among school-aged children.

Conclusion

In light of the current study findings, there were statistically significant improvements in the mean knowledge scores of parents and their children regarding gaming disorder and self-regulation after the implementation of the parent-based module. As well, children's game addiction scores were decreased and there was an improvement in children's self-regulation after the implementation of parent-based module intervention in comparison to before the intervention. There was a negative statistically significant correlation between children's game addiction with total knowledge and self-regulation score. Also, there was a positive statistically significant correlation between children's total knowledge score and self-regulation total score.

Recommendations

Based on the findings of the current study, the following recommendations are suggested:

– Guidelines Parent-based module intervention on gaming disorder and self-regulation should be given to school-age children students and their parents to prevent gaming disorder and improve their self-regulation, knowledge, and behaviors.

– Schools at all levels should routinely include education about gaming disorders and self-regulation and expand the infrastructure they have in place for other potentially problematic behaviors to encompass issues with electronic media.

– Provide children, their parents, and educators with a training workshop to recognize behavioral problems and how to deal with these problems.

– Further research is needed to understand the underlying causes of video and internet gaming addiction and to explore effective preventative or intervention strategies for these children.

– Further research on a larger sample and in other settings is needed to generalize the results, using a multidisciplinary approach.

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