Original Article

Effectiveness of an Intervention Program to Develop and Enhance Protective Skills against Game Addiction among 4th through 6th Grade Students

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Background: A significant percentage of children in Thailand are addicted to computer-based (online or offline) games. Protective factors in children and adolescents may help guard against or minimize the development of game addition.

Objective: To study the effectiveness of an intervention program aimed at developing and enhancing protective skills against game addiction among 4th through 6th grade students in Bangkok, Thailand.

Materials and Methods: The present study used a quasi-experimental research design, and a total of 12 students were included. The program consisted of 12 one-hour sessions that were designed to enhance student self-esteem, social skills, and self-discipline. Game Addiction Protection Scale (Game-P) (child version) was measured before and immediately after the program. Data between groups were compared using Wilcoxon matched-pairs signed-ranks test.

Results: The results revealed that student participants had a higher level of protection against game addiction after completing the 12-hour intervention program, as demonstrated by a significant increase in Game-P scores-especially in the child- and family-related subscales.

Conclusion: The intervention program aimed to enhance protective skills against game addiction among 4th through 6th grade students demonstrated significant effectiveness. Further study with a larger sample size and a randomized controlled trial (RCT) design is warranted. Moreover, there should be a longitudinal study to measure the long term effect of the intervention program.

Keywords: Effectiveness, Intervention program, Game addiction, Protection, Students

J Med Assoc Thai 2018; 101 [Suppl. 1]: S13-S18
Full text. e-Journal: http://www.jmatonline.com

People addicted to the internet, social media, and games experienced symptoms similar to those exhibited by substance dependence and pathological gambling patients. A sense of satisfaction in the engagement of electronic media-based activities impaired the ability of self-control especially the time engaged in the activities. Although they may have tried to quit or reduce the amount of time they spend playing games, addicts often lack the control needed to stop. When interrupted or stopped, game addicts often developed feelings of anger and frustration, and they often continued until faced with adverse consequences[1,2]. A 2007 study of game addiction in Thailand revealed that 13.3% of children were addicted to online games[3]. In 2015, the rate of children addicted to games in Thailand increased to 15%[4]. According to the results of a 2014 survey, children younger than 14 years were the primary population who used computers and internet between 2010 and 2014 in Thailand[5]. This finding was consistent with a 2013 study that reported that the most preferred internet activity among

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How to cite this article: Thana-ariyapaisan P,Pornnoppadol C,Apinuntavech S,Seree P. Effectiveness of an intervention program to develop and enhance protective skills against game addiction among 4th through 6th grade students. J Med Assoc Thai 2018;101;Suppl. 1: S13-S18.

children younger than 15 years was the playing of online games[6].

The etiologies of game addiction are multifactorial and interrelated. The main causes included family-related factors, social-related factors, and child-related factors[3], as well as the addictive properties of the online games themselves[7]. Game addicts often faced with several negative consequences, including low academic achievement[1,8-11], health problems[12,13], emotional problems[13], behavioral problems[1,2], and family problems[2,14]. Moreover, there have been several reported incidents of death by suicide[15] or homicide[16], related to game addiction.

Protective factors against internet and game addiction in children and adolescents-especially internal factors, like responsibility, locus of control, planning ability, interpersonal relationships, self-esteem, and self-efficacy of children-demonstrated a better ability to prevent or minimized internet and game addiction better than external factors, like parental relationship and family functionality[17,18]. In response to this ongoing and evolving addiction crisis, the authors of this study designed an intervention program aimed to develop and enhance protective skills against game addiction among 4th through 6th grade Thai students. The program consisted of three modules, including self-esteem, social skills, and self-discipline. The results of this study will broaden the existing body of knowledge about game addiction among children and adolescents, and will help guide parents, teachers, clinicians, and policy makers in how to develop protective factors in children who are at risk for developing game addiction.

Objective

To study the effectiveness of an intervention program aimed to develop and enhance protective skills against game addiction among 4th through 6th grade students in Bangkok, Thailand.

Materials and Methods

Participants

A total of 347 fourth, fifth and sixth grade students of Wat Ratsattatam School (Bangkok, Thailand) completed the Game Addiction Protection Scale (Game-P) (child version). From the total, 125 of the participants had a high Game-P score (35 to 48), 113 had a medium Game-P score (29 to 34), and 109 had a low Game-P score (≤28). The lowest and highest possible Game-P scores are 0 and 48, respectively. Sample size was calculated using the following formula:

$$n = \left[\frac{\left(Z_{\alpha}+Z_{\beta}\right)\sigma}{\Delta}\right]^2 = \left[\frac{(1.96+0.84)6.162}{6.13}\right]^2 = 7.92 \approx 8$$

α = type I error at significant level = 0.05, therefore $Z_{\alpha/2} = 1.96$

β = type II error at 2%, power of test = 80%, therefore $Z_{\beta} = 0.84$

Δ = 6.13 ($\Delta_{pre} = 27.47$, $\Delta_{post} = 33.60$) based on the study of Tanthanawigrai et al[19]

$\sigma = 6.162$ ($\sigma_{pre} = 6.162$, $\sigma_{post} = 5.228$) based on the study of Tanthanawigrai et al[19]

Sample size of 12 (50% more of the calculated sample size (n = 8)) were determined to compensate for possible drop out. Twelve of the 109 students who had the lowest Game-P score were recruited to participate in the Game Addiction Protection Program (Figure 1). Parents of all participants gave informed consent prior to data collection and intervention.

Intervention program

The developed intervention program aimed to enhance protective skills against game addiction was examined by two child psychiatrists and a clinical psychologist to ensure the appropriateness of its structure and content. The program, which was developed to improve the student's self-esteem, self-efficacy, social skills, and self-discipline, was delivered to participants over 12 one-hour sessions. Self-esteem, self-acceptance, self-worth, self-respect, and self-confidence were developed by having students participate in various individual and group activities. Self-esteem was promoted in every activity, with other

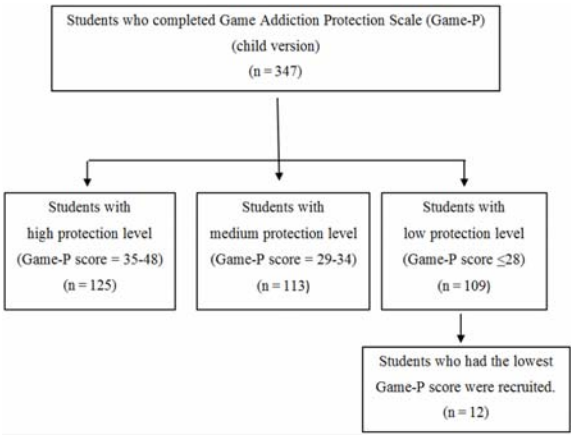

Figure 1. Flow diagram of sample group selection.

social skills being simultaneously improved through a variety of competition-based activities. Students were also exposed to activities that require and promote problem-solving skills and teamwork. To promote self-discipline, the researchers dedicated the first activity to discussed about the necessity of group rules. The participants were then tasked with working together and without supervision to establish the common rules for the group. Each participant was then assigned a duty or duties that had to be performed before an activity or session begin. An individual responsibility within group setting facilitated the demonstration and development of responsibility to both oneself and group.

Measurement

The Game Addiction Protection Scale (Game-P) (child version; 16-item short version) was developed by Pornnoppadol et al[20]. This scale contained 16 items that assessed protective factors against game addiction. Each of the 16 items is rated using a 4 point Likert scale (0 = never, 3 = always). A higher score indicated a higher level of protection against game addiction. The result of previous study revealed that the subjects who had high scores on Game-P showed lower possibility of computer game addiction (OR = 7.5, 95% CI = 5.12 to 11.04) compared to the subjects who had low scores (p<0.001)[20]. Game-P (child version) was found to have good reliability, with Cronbach's alpha coefficient of 0.78[20]. All subjects completed Game-P at pre-intervention and immediately after completion of the intervention program.

Ethical consideration

The protocol for this study was approved by the Siriraj Institutional Review Board (SIRB), Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand (Si. 041/2015). Written informed consent was obtained from the parents of all participants prior to their inclusion in this study.

Statistical analysis

Data analysis was performed using SPSS Statistics version 18.0 (SPSS, Inc., Chicago, IL, USA). Demographic and behavioral data were summarized using descriptive statistics. Since the data were not normally distributed, pre-intervention and post-intervention Game-P scores were compared using Wilcoxon matched-pairs signed-ranks test. The data were presented as number and percentage or mean±standard deviation. The p-value <0.05 was regarded as statistically significant.

Results

The sample group consisted of 12 participants aged 10 to 13 years, and 7 of them were male. All participating children played games, and some played both online and offline games; however, most children (62.5%) played online games. Every participant reported spending money to gained internet access at game shops located in close proximity to their home or school. A majority of subjects (5/12; 41.7%) reported spending more than two hours per day playing games (Table 1).

A comparison of Game-P scores before and after intervention

All 12 participants attended at least 80% (10 of 12) of the scheduled 1-hour sessions. The median pre-intervention Game-P score was 19.50 (low level). After the 12-hour intervention program, the median Game-P score significantly increased to 31.50 (medium level) (p = 0.002) (Table 2). Moreover, 4 participants

Table 1. Demographic and behavioral characteristics of participants (n = 12)

Demographic and behavioral characteristics of participants	n (%)
Gender	
Male	7 (58.3)
Female	5 (41.7)
Age group	
10 to <11 years	5 (41.6)
11 to <12 years	4 (33.3)
12 to 13 years	3 (25.0)
Motivations for playing games	
Need for relaxation	9 (45.0)
Feeling bored of studying	4 (20.0)
Feelings of unhappiness	4 (20.0)
Need for excitement and challenge	3 (15.0)
Type of game played	
Online game	10 (62.5)
Offline game	6 (37.6)
Location of game playing	
Game shop close to home	11 (73.3)
Game shop close to school	2 (13.3)
Friend's home	2 (13.3)
Amount of time spent playing games	
<1 hour	1 (8.3)
1 hour	2 (16.7)
>1 to 2 hours	4 (33.3)
>2 hours	5 (41.7)

Table 2. Comparison of pre-intervention and post-intervention Game-P scores by factor subscale

Variables	Game-P		t-value	*p*-value
	Pre-intervention Median (min, max)	Post-intervention Median (min, max)		
Subscales				
Social-related factors	2.5 (0, 5)	4.0 (1, 6)	17.5	0.095
Family-related factors	4.0 (2, 6)	6.5 (3, 11)	3	0.004*
Child-related factors	12.0 (6, 14)	22.0 (12, 30)	0	0.002*
Total Game-P scores	19.5 (12, 20)	31.5 (21, 37)	0	0.002*

* The *p*-value <0.01 indicates statistical significance (Wilcoxon matched-pairs signed-ranks test)

achieved a post-intervention Game-P score within high level range. Among the 3 sub-scales of protective factors, child-related factors increased more than family-related factors, but both increases were statistically significant ($p = 0.002$ and $p = 0.004$, respectively). The social-related factors sub-scale increased from the baseline, but the difference did not achieved statistical significance ($p = 0.095$) (Table 2).

Discussion

Based on the review of the literature, as one of the early studies to develop an effective intervention program to develop and enhance protective skills against game addiction. The results found in this study revealed that the Game Addiction Protection Scale (Game-P) (child version) scores of participants included in the final analysis were significantly increased ($p = 0.002$), especially in the child-related and family-related sub-scales (Figure 2). This finding suggested that this intervention program led to an increased level of protection against game addiction in these children.

Kweon and Kim described a prediction model for protective factors related to internet game addiction[17]. They identified that personal factors including responsibility, locus of control, planning ability, interpersonal relationships, self-esteem, and self-efficacy, played an important protective role against the development of game addiction. Moreover, intrapersonal factors in children could prevent internet addiction better than interpersonal factors[18]. Therefore, interventions that focused on children alone could add some benefits in this particular area. Sakuma et al discovered that 10 adolescents with Internet Gaming Disorder [IGD] who completed 8 nights and 9 days at Self-Discovery Camp [SDiC] improved self-efficacy and problem recognition skills, as well as reduced total gaming time[21]. The findings of the present study were consistent with those of the aforementioned studies that internal factors are essential for preventing and alleviating game addiction.

The psychological intervention program described in the present study consisted of several activities that helped strengthen child-related protective factors. The activities that promoted self-esteem-especially Praise Box and Magic Box-were also effective for building self-acceptance and self-confidence. During program-related activities, it was noted that almost all participants raised their hands to share their opinions, they developed an awareness of what they were good at, and they praised their friends more frequently. Furthermore, an activity called Story of the Frog appeared to improve participant feelings of self-respect. The activities designed to promote interpersonal relationships-especially Let's Find Solutions, Distracted Young People Addicted to Games, and Let's Uncover the Facts-were especially effective for building participant social skills. In addition, participants were trained to be responsible for their assigned duties, and to learn about success by participating in activities called Star Charts and My Tree. As a result of these improvements in child-centered factors and skills, the protection level against game addiction based on Game-P scores significantly increased in the study population.

The current study has several limitations. First, the size of the study population was relatively small. Thus, the study lacked sufficient power to identify all the significant differences between the pre- and post-intervention groups. Second, the study lacked a control group. Third, the outcome of the current study was the change in Game-P scores, which represented the protection level against game addiction-not the gaming behavior itself. Further study with a larger sample size and a randomized controlled trial [RCT]

design is warranted. Future studies should also prospectively examine students who participate in the intervention program using a tool that can directly measure gaming behaviors, such as the Game Addiction Screening Test [GAST][22]. Fourth, there should be a longitudinal study to measure the long-term effect of the intervention program. Lastly, given that the current study population consisted of 4th through 6th grade students, the results of this study should not be generalized to other sample populations.

Conclusion

An intervention program designed to develop and enhance protective skills against game addiction among 4th through 6th grade students was shown to increase the level of protection against game addiction. After the intervention, Game-P scores significantly increased-especially in the child- and family-related factors subscales.

What is already known on this topic?

The risk of becoming addicted to computer games can be minimized by enhancing protective factors, including child-related, family-related, and social-related factors.

What this study adds?

Protective skills against game addiction among 4th through 6th grade students were developed and enhanced by a psychological intervention program. This program focused on improvement in several child-related protective factors, including self-esteem, self-efficacy, self-regulation, and interpersonal relationships.

Acknowledgements

The authors gratefully acknowledged the students who participated in this study, and the school director and teachers at Wat Ratsattatam School for their assistance with the data collection.

Potential conflicts of interest

None.

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