

Original article

Effects of social cognitive enhancement with family involvement program on game addictive prevention in male junior high school students

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Background: Gaming addiction is addressed in the 11th revision of the International Classification of Diseases (ICD-11) as its high negative effects to personal, family, social, educational, and occupational aspects of adolescents' life.

Objective: This quasi-experimental research aimed to examine positive effects of social cognitive enhancement with family involvement (SCEFI) program on game addictive prevention in male junior high school.

Methods: Sixty-two of 8th Grade students were equally assigned into the experimental and comparison groups. The experimental group received the SCEFI program plus one activity of family involvement while the comparison group received routine activities. The study intervention was 7 weeks with 3 times data collection at: before-intervention, immediately after-intervention, and 4 week follow-up.

Results: The results revealed that those within the experimental group had significantly higher mean scores of game addiction knowledge, self-regulation in game playing, and game monitor behaviors than those before-intervention ($P < 0.001$) and also higher than those in the comparison group at immediately after-intervention and at follow-up ($P < 0.001$). Additionally, those within the experimental group showed significantly lower levels of game addiction at immediately after-intervention and at follow-up than those before-intervention ($P < 0.001$) and also lower than those in the comparison group at immediately after-intervention and at follow-up ($P < 0.001$).

Conclusion: This program is successfully implemented and should be further suggested to enable the social cognitive thinking of those with addictions to reduce their levels and also to prevent novice students from game initiation.

Keywords: Game addictive prevention, social cognitive theory, family involvement, male junior high school students.

Gaming is a popular entertainment or a competitive activity that causes several health problems worldwide. Currently, the World Health Organization (WHO) has added game addiction as a disease of gaming disorder. ⁽¹⁾ Gaming disorder is addressed in the 11th revision of the International Classification of Diseases (ICD-11) since the year

2018. A diagnosis of a person who has gaming disorder is those who has impaired control over their gaming habits, prioritizes gaming over other interests and activities, and continues on playing games despite its negative consequences of for at least 12 months period. ⁽¹⁾ In Thailand, the Child and Adolescent Mental Health Rajanagarindra Institute (CAMRI) reports negative health effects for game players as causes aggressive behaviors, stress, anxiety and depression, and it also reduces academic and work efficiency along with deteriorates relationships with surrounding people. In addition, there is a report on attempted suicides and murders which reflects negative effects on society as a national problem. ⁽²⁾

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Game addiction incidences and trends continue to rise worldwide. In 1998 - 2016, game addiction rates were found to be 0.7 - 15.6%⁽³⁾ and was eventually high in children and adolescents with an addition rate of 1.0 - 9.0%.⁽⁴⁾ In Thailand, about 80.5% of the adolescents were found to have played online games and 93.1% of the adolescents were senior high school students.⁽⁵⁾ Adolescents aged 16 - 18 years have been found to be the most likely to have game addiction⁽⁶⁾ while adolescents aged 13 - 15 years are at the greatest risk for game addiction.⁽⁷⁾ Male adolescents are at greater risk for game addiction than female adolescents.⁽⁵⁾ A report from the Department of Mental Health (DoMH) in 2017, about 429 children aged 5 - 17 years were found to have game addiction with more males than females at a ratio of 7:1.⁽²⁾ Currently, game addiction among Thai children and adolescents shows on a rising trend and approximately two million children and adolescents are at risk of game addiction.⁽⁸⁾ In Bangkok also has a high prevalence (78.0%) for game addiction.⁽⁷⁾ From in-depth interviews with teachers and junior high school students play games on mobile phones around 80.0% and about 66.7% male students play games more frequently than female students of more than or equal to three hours/day.

Several studies have attempted to develop interventions from different theoretical concepts to combat gaming addictive behavior: the concept of Perceived self-efficacy,⁽⁹⁾ self-regulation⁽¹⁰⁾, self-control⁽¹¹⁾, and Life skills.⁽¹²⁾ However, gaming was developed to tempt the needs of the players even more.^(2, 13) It is still difficult to control over the behavior that easily gets addicted by early game players⁽¹⁴⁾ that the gap prevents game addiction. Previous studies were found group process activities, and bringing families to participate in behavior modification; however, the program lacks to modifies the mindset change, belief change, and cognition of families toward controlling for an appropriate playing game behavior of students.^(10, 15 - 16)

Most adolescents still closely connected with their parents and family in a large scale. Parent-adolescent duet can influence each other in the development and prevention of risky adolescent health behavior⁽¹⁷⁾ since parents are proximal psychosocial environment factors that can help guide treatment⁽¹⁸⁾, in fact, it might support that family involvement as key initiation for any family researcher concern. In addition, Chen L, *et al.*⁽¹⁹⁾ found that self-efficacy and self-regulation

from Social Cognitive Theory (SCT) were strong predictors of game behavior control. Bonnaire C, *et al.*⁽¹⁸⁾ stated that in lines of treatment research with behavioral problems adolescent, family-based treatment and prevention theories and methods are empirical evidences. Therefore, individual and environmental factors are the key factors to prevent game addiction. The application of the SCT of Bandura^(20 - 21) to modify the gaming behavior of the sample group is proper for developing this program.

The SCT believes that occurrence and behavior modification of individuals are related to three elements: personal factors, environmental, and behavioral factors, which are responsible for determining each other with consists of three key concepts; Observational Learning, Self-Efficacy, and Self-Regulation. This research is different from the previous studies because it focuses on modifying mindset, belief, and cognition towards self-gaming behaviors to control an appropriate gaming behavior of oneself using the SCT. The program was applied three concepts of Bandura's SCT: 1) Observational learning; 2) Self-regulation to monitor game playing behaviors and set goals; and, 3) Self-efficacy to build self-regulation capacity in game playing. This program included parents to help out the young students to gain full function of brain's development in decision-making with self-control and enable students to cognitively grow past this age.

This study aimed to examine positive effects of social cognitive enhancement with family involvement (SCEFI) program on game addictive prevention in male junior high school.

Materials and methods

Study design

This study was a quasi-experimental with two-group design and was certified by the Institutional Review Board, Faculty of Public Health, Mahidol University, MUPH2019-149. Data were collected for three times: at before-intervention, immediately after-intervention, and 4-week follow-up with a total period of 7 weeks, from January to February 2020.

Sample and inclusion/exclusion criteria

The target population consisted of 8th Grade male students in Bangkok (13 - 15 years). Two schools were selected by simple random sampling and purposive sampling technique for sample selection in each school. The sample size was calculated using

Twisk's formula ⁽²²⁾, 28 subjects in each group. The formula is as follows:

$$n = \frac{(Z_{(1-\alpha/2)} + Z_{(1-\beta)})^2 \sigma^2(r+1) [1+(T-1)\rho]}{V^2rT}$$

Substitute the formula from a similar study ⁽¹⁵⁾ as follows: Where n is the sample size, $Z_{(1-\alpha/2)}$ is the (1- $\alpha/2$) percentile point of the standard normal distribution ($Z_{(1-\alpha/2)} = 1.96$), $Z_{(1-\beta)}$ is the (1- β) percentile point of the standard normal distribution ($Z_{(1-\beta)} = 1.28$), σ is the standard deviation of the dependent variable ($\sigma = 1.71$), r is the ratio of the number of experimental and comparison groups ($r = 1$), T is the number of repeated measurement ($T = 2$), ρ is the correlation coefficient of the repeated measurements ($P = 0.50$), V is the difference between an average score of behavior to prevent game addiction of experimental and comparison groups ($V = 1.28$). To prevent attrition rate, the sample size was added by 10.0% ⁽²³⁾ finally yielded about 62 subjects: 31 subjects in the experimental group and equally 31 subjects in the comparison group. The samples were selected from a classroom which have the most male students and continued with the next classroom until completely 31 subjects in each group. Inclusion criteria specified that the samples were those who played games for more than two hours/day on holidays or played games for more than one hour/day on a regular weekday and had Game Addiction Screening Test (GAST)⁽²⁴⁾ scores lower than 24 points. The exclusion criteria were samples who had health problems or failure to participate in the program.

Research process

The SCEFI program

The experimental group received the social cognitive enhancement with family involvement (SCEFI) program plus one activity of family involvement. The experiment was as follows: Three social cognitive enhancement (SCE) activities were conducted in each session/week, 50 minutes/session.

1st Week: First SCE activity of self-regulation concept was to let the students observe personal game playing behavior in four areas (action, consistency, similarity and accuracy); promoted judgmental process by comparing personal behaviors with the Gamer, The Future Hunting Game video, and analyzed effects from game addiction. The handbook on game addiction awareness was given to persuade and educate the students (game playing behavior control, self-

regulation methods and parental control and care). The self-reaction was processed by setting and recording the first week game playing behavior goal and also determining rewards and punishment. Roles of family involvement, family determined game playing roles, rewards and punishments, assigned duties and responsibilities in the house and built up discipline among students.

2nd Week: Second SCE activity of self-efficacy concept was to encourage the students to exchange experiences with role models who succeeded in regulating game playing time (determining game playing time, self-control techniques, problem-solving skills and stress management). The students assessed personal weekly game playing behavior goals (offered trailer-made reinforcement for those who were successful) and assessed free time. The researcher roused emotions by venting feelings on game playing behavior regulation, exchanging experiences, problems and jointly solving problems, then built-up mastery experience by setting weekly game playing behavior goals for the second time. Roles of family involvement, family encouraged students to perform behaviors based on the set goals, monitored and paid attention to game playing behaviors and persuaded students to adopt appropriate game playing behaviors.

3rd Week: Third SCE activity of brainstorming by assigning students into three groups to analyze game addiction problems from the hypothetical situations (factors, effects and corrective guidelines), then selected good role models who succeeded in achieving goals. The researcher and students exchanged game playing behavior modification experience. Those who did not succeed in achieving goals were referred to their teachers and parents in order to seek appropriate game playing behavior modification guidelines. Roles of family involvement included family spoke with students, listened to students' problems and barriers in adjusting game playing behaviors, and monitored students' game playing behavior modifications continually.

4th week follow-up: the program's sustainability was assessed. At before-intervention, the activities were once carried out with the experimental group's family (31 guardians) within 50 minutes. The family were provided knowledge of modifying the family's mindset, belief, and cognition towards the sample's proper gaming behavior. The activity also suggested the family's roles of involvement in each week. During

the sample group participated in the SCEFI program: roles in building discipline and responsibility (1st week), persuasion roles and behavior regulation (2nd week), and emotional arousal and behavior regulation roles (3rd week). 11 guardians who could participate in activities according to the specified date and time. Therefore, it needed to coordinate with class teachers to explain the family's roles of involvement through a Line group of the sample group (20 guardians). The family also got a handbook on game addiction awareness.

Data collection instruments

The self-administered questionnaires consisted of socio-demographics (13 items), game playing knowledge (15 items) that has been tested for content validity index (1.00) and Kuder-Richardson (KR-20; 0.70), self-regulation in game playing (10 items), game monitor behaviors⁽²⁵⁾ (10 items), that have been tested for content validity index (0.86 and 0.93, consecutively) and reliability (Cronbach's Alpha Coefficient; 0.71, and 0.71, consecutively). The questionnaire of game addiction screening test (GAST) developed by the Child and Adolescent Mental Health Rajanagarindra Institute and the Child and Adolescent Psychiatry Department, Faculty of Medicine Siriraj Hospital⁽²⁴⁾ (16 items) has the reliability is 0.92.

Statistical analysis

The socio-demographic data characteristics used were descriptive statistics, Chi-square test, and Fisher's Exact test if the expected counts less than 5 (which is greater than 20.0%). Hypotheses were tested using an Unpaired student *t* - test to compare the differences between experimental and comparison groups. Two-way repeated measure analysis of variance (ANOVA) compared the differences of all variables in mean scores, and One-way repeated measure ANOVA with Bonferroni method compared the differences of pairwise comparisons within the groups between experimental and comparison groups at before-intervention, immediately after-intervention, and at the 4-week follow-up. SPSS statistics Version 18.0 was used for data analysis and statistical significance was at 0.05.

Results

The socio-demographic characteristics were similar between the experimental and comparison groups (age, teaching management, environmental, family, and game-playing; $P > 0.05$) except for the

longest game playing time ($P = 0.048$) and game playing times at school ($P = 0.021$). However, this research could control extraneous factors from the difference of individual characteristics. Hence, the research could be concluded that it is the change from program management.

At before-intervention, almost all (96.8% equally) of the experimental and comparison groups had low knowledge level about game addiction; they had moderate self-regulation in game playing at 80.6% and 58.0%; and, they had low and medium game monitor behaviors at 48.4% and 54.8%, consecutively (Table 1). Regarding game addiction levels of the experimental and comparison groups had low game addiction scores equally at 100.0% (Table 2).

At immediately after-intervention, the experimental group had increased high level of knowledge about game addiction, self-regulation in game playing, and game monitor behaviors scores (58.0%, 67.7% and 71.0%). The comparison group had low knowledge about game addiction score (71.0%), moderate self-regulation in game playing scores (58.1%) and low and moderate game monitor behaviors scores equally (42.0%) (Table 1). Regarding game addiction levels of the experimental group had totally good results of low scores (100.0%) while the comparison group had increased risk game addiction scores at 12.9% (Table 2).

At 4-week follow-up, the experimental group had high level of game addiction knowledge, self-regulation in game playing and game monitor behaviors scores (64.5%, 71.0%, and 64.5%). The comparison group had low knowledge about game addiction scores (90.3%), moderate self-regulation in game playing scores and game monitor behaviors scores (64.5% and 48.4%) (Table 1). Regarding game addiction levels of the experimental group still had totally good results of low scores (100.0%) while the comparison group increased risk game addiction scores at 29.0% (Table 2). When compared mean differences of the variables between the experimental and comparison groups, mean scores on game addiction knowledge, self-regulation, game monitor behaviors and game addiction levels were similar at before-intervention. At immediately after-intervention, mean scores of game addiction knowledge, self-regulation, game monitor behaviors and game addiction levels of the experimental and comparison groups were statistically different ($P < 0.001$) and at follow-up period ($P < 0.001$) (Table 3) (Figure 1).

Table 1. Percentages of mean scores of all variables.

| Variables | Percentages of mean scores | | | | | |
|--|----------------------------|------------------------|----------------------------|------------------------|--------------------------|------------------------|
| | Low (0.0 - 59.9%) | | Moderate (60.0 - 79.9%) | | High (80.0 - 100.0%) | |
| | Experimental (n = 31) | Comparison (n = 31) | Experimental (n = 31) | Comparison (n = 31) | Experimental (n = 31) | Comparison (n = 31) |
| Game addiction knowledge | | | | | | |
| Before-intervention | 96.8 | 96.8 | 3.2 | 3.2 | 0.0 | 0.0 |
| Immediately after- intervention | 6.5 | 71.0 | 35.5 | 25.8 | 58.0 | 3.2 |
| 4-week follow-up | 3.2 | 90.3 | 32.3 | 6.5 | 64.5 | 3.2 |
| Self-regulation in game playing | | | | | | |
| Before- intervention | 9.7 | 32.3 | 80.6 | 58.0 | 9.7 | 9.7 |
| Immediately after-intervention | 0.0 | 16.1 | 32.3 | 58.1 | 67.7 | 25.8 |
| 4-week follow-up | 0.0 | 19.4 | 29.0 | 64.5 | 71.0 | 16.1 |
| Game monitor behaviors | | | | | | |
| Before- intervention | 48.4 | 54.8 | 48.4 | 42.0 | 3.2 | 3.2 |
| Immediately after-intervention | 0.0 | 42.0 | 22.6 | 42.0 | 77.4 | 16.0 |
| 4-week follow-up | 0.0 | 45.1 | 35.5 | 48.4 | 64.5 | 6.5 |

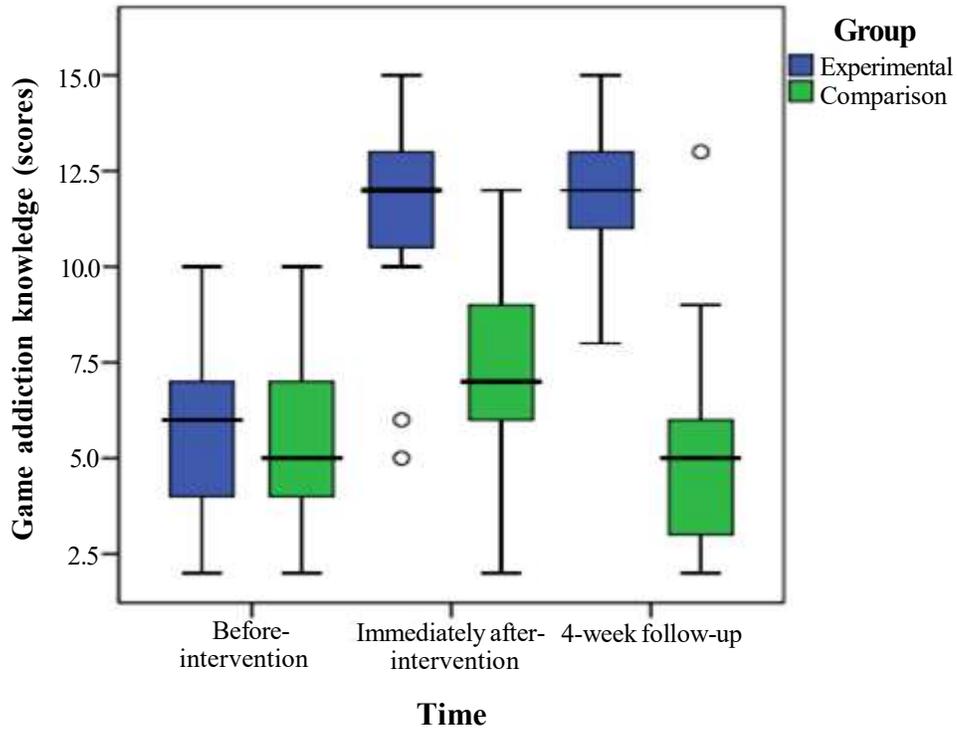
Table 2. Percentages of mean scores on game addiction levels.

| Game addiction levels | Percentages of mean scores | | | | | |
|--------------------------------|----------------------------|------------------------|--------------------------|------------------------|--------------------------|------------------------|
| | Normal (< 24 scores) | | Risk (24 - 32 scores) | | Addiction (≥ 33 scores) | |
| | Experimental (n = 31) | Comparison (n = 31) | Experimental (n = 31) | Comparison (n = 31) | Experimental (n = 31) | Comparison (n = 31) |
| Before-intervention | 100.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Immediately after-intervention | 100.0 | 87.1 | 0.0 | 12.9 | 0.0 | 0.0 |
| 4-week follow-up | 100.0 | 71.0 | 0.0 | 29.0 | 0.0 | 0.0 |

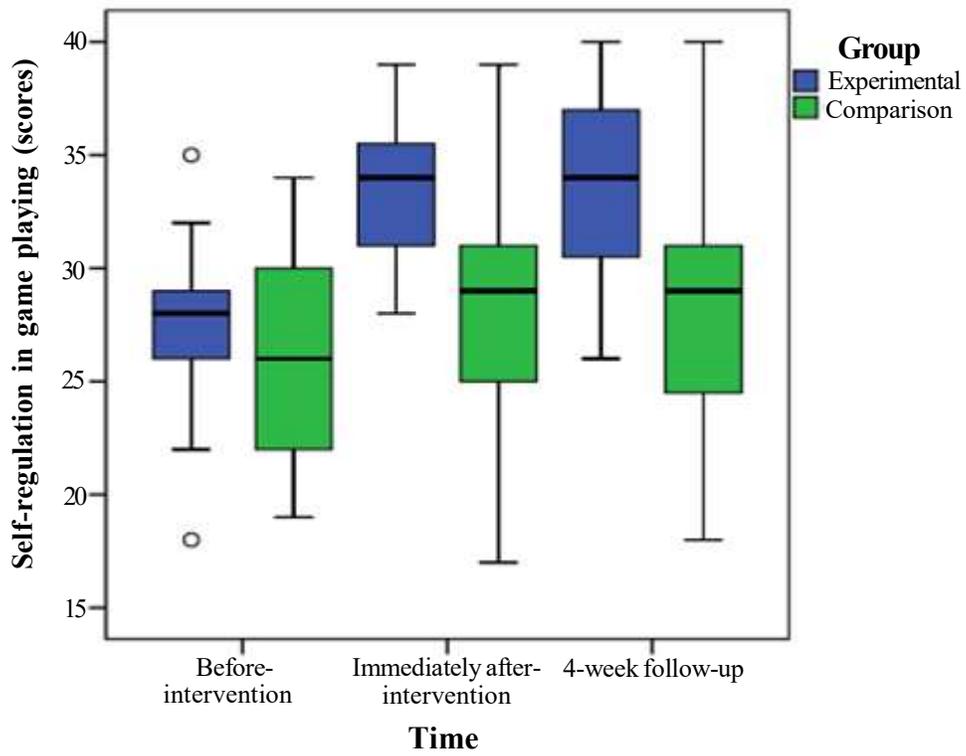
Table 3. Comparison of differences in mean scores of all variables.

| Variables | Before-intervention M (SD) | Immediately after-intervention M (SD) | 4-week follow-up M (SD) | | P- value |
|--|-------------------------------|--|----------------------------|--------------------------------------|---|
| Game addiction knowledge | | | | | |
| Experimental group | 5.71 (1.76) | 11.61 (2.23) | 11.97 (1.54) | Group Time Group*Time | <0.001* <0.001 ^b <0.001 ^b |
| Comparison group | 5.29 (1.95) | 7.45 (2.20) | 5.19 (2.36) | | |
| | | | | | |
| Self-regulation in game playing | | | | | |
| Experimental group | 27.39 (3.29) | 33.45 (3.14) | 33.84 (4.03) | Group Time Group*Time | <0.001* <0.001 ^a 0.005 ^a |
| Comparison group | 26.19 (4.45) | 28.06 (5.29) | 28.23 (4.88) | | |
| | | | | | |
| Game monitor behaviors | | | | | |
| Experimental group | 24.10 (3.86) | 32.81 (2.81) | 33.10 (2.90) | Group Time Group*Time | <0.001* <0.001 ^a <0.001 ^a |
| Comparison group | 23.32 (4.09) | 25.87 (6.02) | 24.84 (4.62) | | |
| | | | | | |
| Game addiction levels | | | | | |
| Experimental group | 16.42 (4.37) | 10.39 (3.84) | 8.17 (3.33) | Group Time Group*Time | <0.001* <0.001 ^a <0.001 ^a |
| Comparison group | 16.97 (4.29) | 16.45 (7.00) | 18.81 (6.91) | | |
| | | | | | |

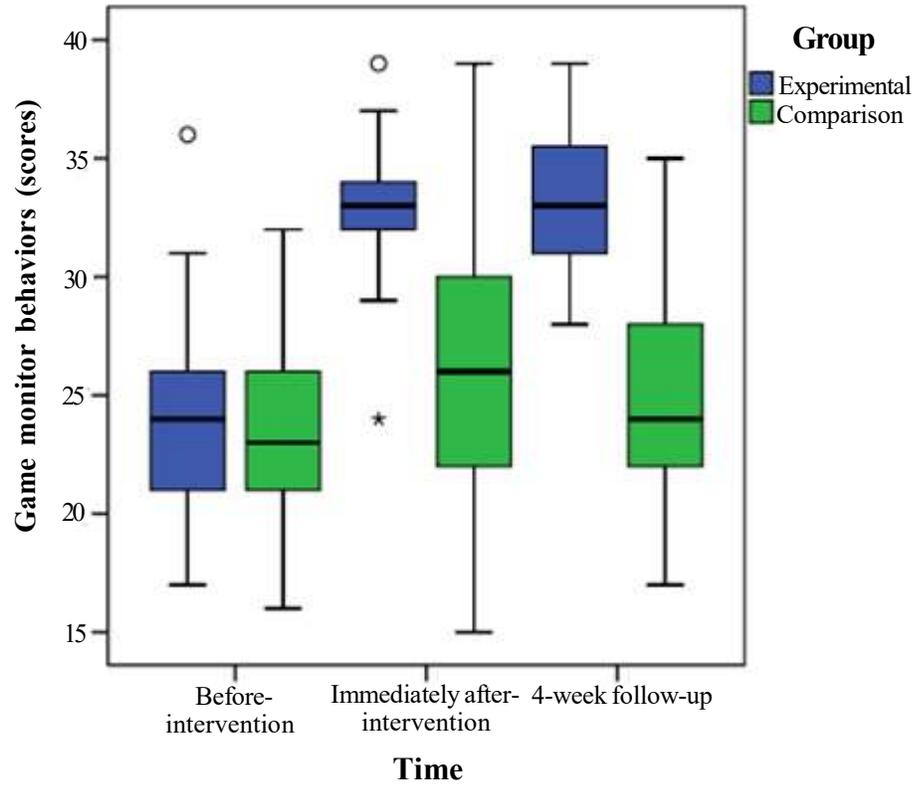
* $P < 0.05$, ^a = Sphericity Assumed, ^b = Greenhouse-Geisser



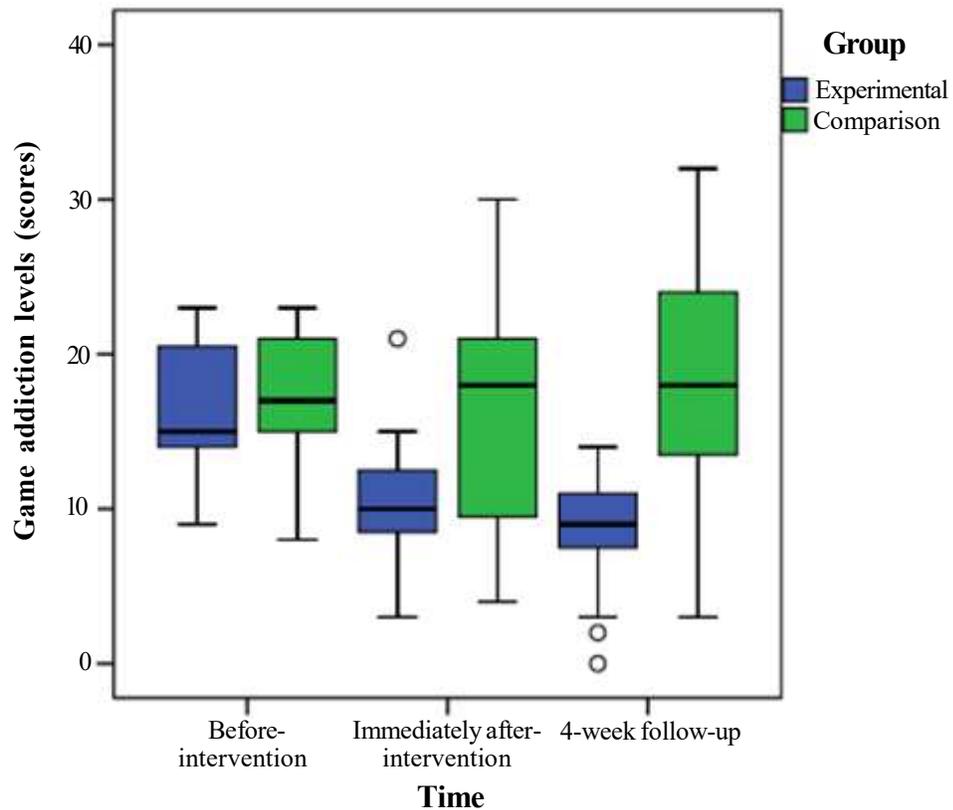
(A)



(B)



(C)



(D)

Figure 1. Comparison of differences in mean scores of all variables between the experimental and comparison groups. (A) Game addiction knowledge; (B) Self-regulation in game playing; (C) Game monitor behaviors; and, (D) Game addiction levels.

Discussion

Game addiction knowledge

The SCEFI program can be described as significantly effective in increasing accurate knowledge and understanding of game addiction. The researcher persuaded and educated the subjects about observational learning concepts to learn from live models, such as family. Consistent with the study effect of the self-efficacy promotion program on computer game playing among in school age child⁽⁹⁾ and the group process and family participation for reducing game addiction of adolescents.⁽¹⁶⁾ The symbolic models who were able to regulate game playing time⁽⁹⁾, divided analysis groups, and classroom presentations. In addition, the program distributed the game addiction awareness handbook for students and prepared families by providing game addiction knowledge, supported family involvement, and distributed the game addiction awareness handbook for families. This was consistent with Apisitwasana N, *et al.*⁽¹⁰⁾, who organized educational activities on attitude toward games and effects from game addiction in addition to providing self-training and self-regulation information for parents.

Self-regulation in game playing

The SCEFI program can be described as significantly effective in increasing self-regulation. The perceived self-efficacy concept and learning from live models through mastery experience was applied by practicing to achieve game playing behavior goals each week. Consistent with the study effect of the self-control program on online game addiction behavior of upper secondary school students.⁽¹¹⁾ Learning from vicarious experience by exchanging experiences with role models who were successful in regulating game playing, verbal persuasion from the researcher to provide game addiction prevention knowledge and emotional arousal. In addition, family involvement was promoted in rousing emotions. This was consistent with Karamee A. and Chantapreeda N.⁽⁹⁾ whose study used real-person models (with computer game experience), symbolic models (video clips), verbal persuasion on appropriate game playing guidelines and daily records.

Game monitor behaviors

The SCEFI program can be explained to have effects causing reduced inappropriate behaviors and

increased appropriate game playing behaviors. The program applied the self-regulation concept, goal setting by the observation method by observing personal game playing behaviors (action, consistency, similarity and accuracy), judgment and comparison with symbolic models (the Gamer – The Future Hunting Game video). In addition, activities led the family to become involved in determining roles to build discipline and responsibility, specified rules for game playing, rewards and punishment, encouragement for students and persuade students to have appropriate game playing behaviors. This was consistent study the effectiveness of school-and family-based interventions to prevent gaming addiction among grades 4 - 5 students in Bangkok, Thailand.⁽¹⁰⁾ and Ferreira F, *et al.*⁽²⁶⁾ also suggested that monitoring the length of time spent on gaming online and behavior modification can help the family to keep tracking unhealthy patterns of gaming behavior.

Game addiction levels

The SCEFI program can be explained to be effective in reducing game addiction levels. The program applied the SCT, the self-regulation concept and goal setting to regulate game playing behaviors, build discipline and responsibility in order for the subjects to spend free time beneficially. Activities emphasized analytical thinking among the subjects to create self-learning and inter-learning exchanges together with friends, role models, family and the researcher. In addition, activities implemented family involvement by holding meetings to explain regulation roles, emotional arousal, verbal persuasion and good role models for game addiction prevention. This was in line with studies conducted by Irmak AY. and Erdogan S.⁽²⁷⁾ who studied the digital game addiction predicted by self-efficacy and self-control and Apisitwasana N, *et al.*⁽⁹⁾ that the program to have positive effects in reducing time spent playing games and reducing game addiction. Moreover, the findings concurred with a study conducted by Hamu AH, *et al.*⁽²⁸⁾ who studied the effect of cognitive commitment of behavioral therapy on internet addiction among adolescents in Kupang City.

This study was limited to carry out of activities about family involvement since not all family participated, so the researcher involved the family who could not participate in the program by parents' group line each week.

Conclusion

The results of this study suggest that the SCEFI program had improved the game addiction knowledge, self-regulation in game playing, game monitor behaviors and decreased levels of game addiction. The program has applied three concepts of Bandura's Social Cognitive Theory, the observational learning concept, the self-regulation concept to male students to regulate game playing behavior and game monitor behaviors. The perceived self-efficacy concept can build self-regulation capacity. This program should be suggested to enable the students' social cognitive thinking of those novices from preventing game addiction or reducing game addiction of those already addicted.

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Conflict of interests

The author(s) declared on potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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