

# The Effects of Computer-based Educational Games on Self-efficacy of 8-12 Children with Hemophilia

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## Abstract

**Background:** Hemophilia is a chronic bleeding disease and can interfere with daily performance of children. These children require continuous training to prevent bleeding. Since children nurses play an important role in the education of sick children and their self-efficacy and the increase use of educational computer games, the use of educational games for teaching self-efficacy to children with hemophilia can be effective. Therefore, we aimed to explore the impact of computer-based learning games on the self-efficacy of 8-12 year-old children with hemophilia.

**Methods:** The present study is an experimental interventional study on 40 children with hemophilia aged 8-12 years old during 2014. Data collection tools were a standard self-efficacy questionnaire and patients' demographic forms. Data were analyzed using SPSS software version 16.

**Results:** Based on the findings of this study, the mean self-efficacy scores of the samples before, after and one month after intervention were 53.25, 60.95, 60.90 in the case group, and 50.45 and 55.2 in the control group before and one month after the intervention, respectively. The findings revealed that self-efficacy scores after and before the intervention differed significantly.

**Conclusion:** Educational hemo-action games increased self-efficacy in 8-12 year-old children with hemophilia.

**Keywords:** Educational games, Computer games, Self-Efficacy, Hemophilia.

## Introduction

Health, both individually and collectively is the most important prerequisite for human life and success in social roles <sup>1</sup>. Hemophilia is a chronic disease with symptoms that affect children's health <sup>2</sup>. Hemophilia is an inherited sex-dependent bleeding disorder that was identified and described for the first time in the fifth century. In 1828, this disease was called hemophiliac or haemophiliac<sup>3</sup>. Hemo stands for blood, and philia means the tendency <sup>4</sup>. A person with hemophilia tends to bleed excessively. In general, there are more than 400,000 patients with hemophilia worldwide <sup>5</sup>. According to the records of the Hemophilia Center of Fars Province, until the end of October 2012, 692 patients with hemophilia were identified and recorded in Fars province, of which 40 children aged 8-12 years were living in Shiraz. Many problems

have been identified in patients with hemophilia including physical problems that interfere with the routine daily lives of the patients.

The self-efficacy of children with hemophilia is also affected by the circumstances of their illness<sup>6</sup>. Children with hemophilia have a lower muscle strength and fitness and have many emotional, psychological, behavioral, and family problems compared with healthy individuals <sup>7</sup>. Appropriate training in this area would be helpful. These patients are very vulnerable against stress because of weak joints. Motion response in stressful conditions leads to repeated bleeding, pain, disability and more joint damage. With proper training, the problems resulting from lack of self-efficacy can be greatly reduced based on the correct principles <sup>8</sup>. In a study in Iran, the researchers found that "anxiety

disorders, irritability, desire for death and suicidal ideation were common in children and adolescents with hemophilia”<sup>9</sup>.

Enhancing the self-efficacy of children with hemophilia can contribute to their overall well being<sup>10</sup>. Self-efficacy refers to self-perceptions of their skills and abilities to perform an action successfully and the proper functioning<sup>11</sup>. In other words, self-efficacy influences the understanding of performance and adaptive behavior and the condition in which people are trying to achieve<sup>11</sup>. Bandura and colleagues believe that the sense of self-efficacy is shaped through the tolerability of challenges, in a step-by-step behavioral process. Self-efficacy is the major precondition for behavior changes including health behaviors and a means for the promotion of health and education of patients<sup>12</sup>. Currently, advances in science and technology have profoundly affected our lifestyle. Educational methods have also changed drastically. Consequently, these innovations have created a new generation of educational tools that will help students in the learning process. Many studies show that educational computer games enhance children’s learning in the fields of science, math, and literature. These games not only improve performance but also increase children’s learning. In the past, computers were just used as a teaching aid instrument; but nowadays, the use of educational computer games is considered as an effective teaching method for learning. Research literature confirms the widespread use of educational computer games among children<sup>13</sup>. This issue persuades game makers to create new games and prompts researchers to perform further research regarding the use of educational computer games<sup>13</sup>.

Educational games are games designed with specific curriculum objectives. They should facilitate learning new information<sup>14</sup>. Learners, especially children enjoy learning when learning is accompanied with joy. More importantly, by using educational games, children are involved in learning new educational concepts indirectly<sup>14</sup>.

Hemo-action game is a computerized educational game that is designed by the World Federation of Hemophilia to educate individuals regarding hemophilia and the procedures related to the care of children with hemophilia. In the nursing profession, education is an important

part of care and creating knowledge, skills and changing behavior; therefore, nurses should consider training the patient as a priority. The purpose of education is to promote health, prevent or mitigate disease, create health in individuals or groups by influencing beliefs, higher-level thinking, and behavior<sup>15</sup>. Therefore, we aimed to explore the impact of computer-based learning games on the self-efficacy of 8-12 year-old children with hemophilia.

## Patients and Methods

This experimental interventional study was done on 40 children aged 8-12 years with hemophilia based on the census approach from Shiraz who referred to the hemophilia ward of Shahid Dastgheib Hospital, affiliated to Shiraz University of Medical Sciences, Shiraz, southern Iran during 2014.

The inclusion criteria were age of 8-12 years, residing in Shiraz, filling out the consent form by the patient and his parents consciously, being literate, having no other diseases approved by the physician, admission to the hemophilia ward, and not being trained through hemo-action computer games. Based on blocking randomization method 20 patients were placed in each case and control group.

Data were collected within 2 months from June 2014 to August 2014. Following the eligibility assessment, the patients were familiarized with the study and enrolled. The following questionnaires were used for data collection.

### Demographic Information Questionnaire

The questionnaire included questions about age, sex, type of hemophilia, history of training, educational level, presence of disability, parental occupation, and income level of the parents.

### Sherer self-efficacy questionnaire

This questionnaire was devised by Sherer in 1982 with the aim of providing a tool for further research and identifying the different self-efficacy levels of the general public and it is made up of 23 items. Of these 23 items, 17 are related to general self-efficacy, and six other matter related to their experiences in social situations. In this study “17 female self-efficacy scale Sherer” will be used which contains 17 questions scored on a scale of 1-5 from strongly agree to completely disagree. The

score of items 15, 13, 9, 8, 3, 1 increases from left to right. The point of the rest is increased in reverse order, from right to left. The scores 17 and 85 are the highest and the lowest scores, respectively.

The reliability of the questionnaire was evaluated by Beirami and the internal consistency of 79% was obtained. In the study of Asgharinejad and colleagues, who study the psychometric qualities of the Persian version of the general self-efficacy scale of Sherer, the coefficient of internal consistency of the scale was 83%<sup>16</sup>. In a study by Najafi and colleagues on the relationship between self-efficacy and mental health in high school students, a reliability of 80% was obtained for the questionnaire and  $r=0.45$ <sup>17</sup>.

## Intervention

### Case Group

Firstly with the help of the staff on the pre-determined time, 10 of the children in the case group were transferred to the Internet cafe.

After transferring all samples to the Internet café, each one of them were placed behind one of the Internet cafe tables, and the hemo-action game was ready. Initially the investigators selected the training manual for all children and secondly with the help of what the children had already learned, such as the definition of hemophilia, its types, symptoms, and means of diagnosis, prevention, and treatment of bleeding was described as the level of their perception. Between the hours of the first session, this was devoted to the training based on specified issues in training booklet of the hemo-action game, catering and awarding was performed. The first session of concept education was done similarly for the 10 remaining patients in the case group.

In the second training session 10 children were selected and transferred to the pre-booked Internet cafe. On the beginning of this session an overview on the previous content was done through questions and answers. After that, online game's steps along with oral explanations were trained by the researcher. After the first two hours of the second session and catering or prize giving, the children were paid to play online. At the end of the second session, the children completed self-efficacy questionnaires again. Ultimately, they were returned to the hospital by taxi.

After the intervention, the case group completed

a self-efficacy questionnaire and training booklets of hemo-action game were given to patients in the control group.

### Control Group

In the first session, all participants in the control group fulfilled both demographic and Sherer questionnaire. Then they only reviewed what they had learnt before. After the review was finished they completed the questionnaire. After a month when they completed the self-efficacy questionnaire for the last time they received a booklet of what had been instructed about the Hemo-action educational game.

Data were analyzed using SPSS software, version 16. Chi-square and Student's t tests were used as appropriated. P value less than 0.05 was considered as statistically significant.

## Results

The case group consisted of 17 (85%) boys and 3 (15%) girls and the control group consisted of only boys. The mean $\pm$ SD age of the children in the case and control groups were  $10.69\pm 2.1$  and in the control group was equal to  $10.50\pm 3.1$  years respectively ( $P=0.799$ ). The income of 55% and 70% of parents of the children in the case and control groups was less than 1.5 million Rials (Currency of Iran) per month, respectively ( $P=0.514$ ). Also, we did not find any significant difference between the two groups with respect to the educational level (table 1).

The mean $\pm$ SD self-efficacy scores at the three evaluation times was  $53.25\pm 13.13$  ( $P=0.441$ ) in the case group and  $50.45\pm 9.21$  ( $P=0.44$ ) in the control group (table 2). Paired t test was done between self-efficacy scores before and immediately after the intervention. This difference between the groups can be results of the impact of computer-based learning programs on the self-efficacy of the children in the case group.

## Discussion

The results of the study showed that the self-efficacy of children with hemophilia increased immediately after the intervention. In our study, participants were educated by a computer-based game named Hemo-action and gained a better self-efficacy score compared to the control group. In another study conducted on children fire quench

**Table 1:** Demographic characteristics of the study population and their parents in both groups

Variable	Case, n=20	Control, n=20	P value
<b>Sex (male)</b>	No. = 17	No. =20	0.231
<b>(total - percentage)</b>	Percentage: 85%	Percentage : 100%	
<b>age</b>	10.69±1/2	10.5±1.3	0.799
<b>The amount of parents' income</b>	Code 1: 55%	Code 1: 70%	0.514
<b>(code 1: income ≤ 1.5 million tumans)</b>	Code 2: 45%	Code 2: 30%	
<b>(code 2: income ≥ 1.5 million tumans)</b>			
<b>Level of education</b>	Code 1: 40%	Code 1: 45%	1.00
<b>Code 1 &amp; 2: Education based on class</b>	Code 2: 60%	Code 2: 55%	
<b>Code 1: 1-4 years</b>			
<b>Code 2: 5-6 years</b>			

**Table 2:** The mean and SD of self-efficacy scores before the intervention between the two groups

group	population	Mean	standard deviation	P value
<b>Case</b>	20	53.25	13.134	0.441
<b>Control</b>	20	50.45	9.219	0.441

**Table 3:** The self-efficacy means scores before and immediately after the intervention in case groups

group	Number	Mean	Standard deviation	P value
<b>Case</b>	20			
<b>Self-efficacy score before intervention</b>		53.25	13.134	0.00
<b>Self-efficacy score immediately after the intervention</b>		60.95		

learning by an educational computer game named Fire Captain, the researchers found that the children in the case group had a better rate of knowledge after the intervention <sup>13</sup>. In another study done by Calao comparing two different educational methods, results indicated that children in case group had a better learning in spelling and literature fields but not any differences in other fields <sup>18</sup>. In another study children's self confidence was increased by educational games and they had a better relationship with the peers respectively <sup>14</sup>.

However, no published articles are available reporting the effectiveness of Hemo-action educational game. Our intervention improved the total self-efficacy rate of participants in the Case group.

## Conclusion

According to the results, it can be argued that learning through homo-action games can increase self-efficacy in children with hemophilia. Since nurses in counseling programs and interventions in the treatment and education have an important role, they can improve the self-efficacy of children by the use of new technology through increasing of children's knowledge and information. Therefore, in the process of treatment and care of chronically ill patients, in addition to physical care, interventions to enhance their self-efficacy should also be planned.

**Conflict of Interests:** None Declared.

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