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Original Article

Developing and evaluating the effectiveness of pioneer kindergarten educational program on social skills and executive functions of kindergarten children: A preliminary study on the national plan

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Abstract

Introduction: Previous studies on the factors affecting the generation and spread of crime in society have shown that social, economic, family, and personal characteristics and abilities are among the factors influencing the emergence of crime. According to these findings, the present study was conducted to improve the skills of kindergarten children with a developmental crime prevention perspective, using social skills training, thinking, and teaching the basic concepts of coding.

Materials and Methods: In this study, 32 children were selected among the kindergartens in Mashhad city by a convenient sampling method in 2020. Training presented by kindergarten teachers who participated in the necessary workshops. Gresham and Elliott Social Skills Rating System and Behavioral Rating Inventory of Executive Functions were used for evaluation. Data analyzed by Mann-Whitney and Wilcoxon tests, with SPSS version 23.

Results: The results showed, planning (w= -2.88, *P*= 0.002), inhibition (w= -2.73, *P*= 0.005) and shift (w= -2.61, *P*= 0.008) from executive functions and as well as cooperation (w= -2.20, *P*= 0.03) from social skills have been improved, no other significant changes or improvements were found.

Conclusion: Intervention in kindergarten age using social skills, thinking and coding can improve the cooperation of social skills and planning, inhibition, and shift from executive functions. Finally based on available resources these skills can reduce the economic and personal context of crime.

Keywords: Crime prevention, Education program, Executive functions, Kindergarten, Social skills

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Introduction

Norms and laws emerged from the time human began to form groups for social life. The basic laws, which were simple and clear, over time evolved and with the increasing complexity of society, formed more complex laws. Crimes changed from simple to complex and varied. From that time, members of society want to protect themselves and the society from collapse, they resorted to punishment, coercion for compensation, and retribution to control the breaking of the lows (1-3). In the new perspective on crime, it is not only the wrongdoer who is considered the perpetrator of the crime, but also crime is born in society, grows in society, and finally manifests itself in society, so the society is the one who provides the necessary platform for creating and the development of crime, and it is only at the time of the onset of crime that the wrongdoer enters the crime-making process (1,4). As mentioned, crime is born and developed in society, so punishment is not sufficient to prevent crime because punishment has an effective role only in preventing the appearance of crime in society and has a bare role in preventing the creation and development of crime. Due to the inapplicability of punishment for the creation and development of crime, society was looking for other methods, and the preneed to create a new method to prevent crime at the level of creation and development in society is to recognize the factors affecting its creation and development (5).

Social skills are one of the important factors in the tendency of individuals toward crime. These skills include the performance of the individual in society from making friends to controlling and managing relationships with friends and at a broader level the ability to interact with society (6-8). Past studies have shown that peoples with better social skills are less prone to crime when a person with high social skills can better understand and relate to the community and have fewer conflicting situations with the community therefore less likely to engage in anti-social behaviors. On the other hand, a person with low social skills has a lower ability to communicate and have a mutual understanding of those around him/her, this gap between the individual and other people in social causes segregation and prepares the ground for the emergence of anti-social behaviors (7,9,10).

In addition to social skills that help an individual to understand society effectively and communicate properly with others in the community, most studies have emphasized the relationship between crime and cognitive problems and declare that these abilities play a significant role in reducing the tendency toward criminal activities (5,7,11).

Subsets of cognitive skills also play an effective role in creating crimes. There is a significant relationship between tendencies to high-risk behaviors and response to stressful situations and risk-taking (12,13). According to the cognitive perspective, crime is a behavior that arises from a person's decision at a certain point in time and this decision is influenced by several cognitive factors, including logical thinking, working memory, initiation, and organization, thus reducing the crime can be done by focusing on these cognitive skills in the golden period of peoples life (4,11,14).

In the present study, to improve the skills of preschool children with a developmental crime prevention perspective, social skills training in the form of interactive training along with teaching thinking skills in the form of the story and teaching basic coding concepts in the form of Scratch Jr. Program was used. In addition to the roles that these promotion programs can play on the individual tendency to crimes, they can also have an impact on the economic and social factors in the long run by creating the abilities necessary for future social and economic status. As one of the most important factors in acquiring jobs and income in developed countries is the level of social skills of individuals, on the other hand, studies have shown that people with high social skills have better progress in their jobs (10,13,15). Coding is also one of the essential skills in today's society that is used by many professions and along with the ability to improve cognitive skills can be a good starting point for children to become familiar with coding as one of the most popular jobs and income areas in the future. Also by affecting children's cognitive and social skills in the short term to reduce the individual context of crime and in the long term by creating opportunities for appropriate social

and economic status the social and economic context of crime can be reduced.

Materials and Methods

In this study, assessments done before and after the intervention in 2020 to compile the content a specialized working group with the presence of specialists (5 people, Ph.D. in clinical psychology with specialization in the field of children, master of education with specialization in philosophy in the field of children, professional programmer with specialization in international programming, programmer with specialization in the field of programming education for children, designer of the program master science in occupational therapy with specialization in designing methodologies for the implementation of extensive projects) in the social and crime prevention department of the judiciary was established. After 3 months of reviewing the interventions and resources available in the field of kindergarten programs at the international level due to the lack of a proper program, the decision was made to produce content by the working group.

Therefore, for another 6 months, the working group was working on content production. After producing the content, the produced content was examined for intervention, then the necessary coordination was done to select the pilot city for the project, and finally, Mashhad as the pilot city for the project was selected. After selecting the pilot location, the necessary coordination was done with the Ministry of Education in Khorasan province and finally in Mashhad city. The study was conducted by the ethical considerations of the University of Rehabilitation Sciences and Social Welfare. Subsequently, several kindergarten teachers were selected and coordination was held to hold a session to transfer concepts to the teachers. The session of transferring concepts to the teachers took place during three days of an 8-hour workshop.

Also, the communication route of the teachers with the content providers was created so that they could easily receive guidance from the content providers whenever they encountered a problem or question. The teachers then selected some kindergarten children by the convenient sampling method from the kindergarten they were working in and placed them in two groups, control, and intervention. Inclusion criteria included: age less than 7 years, continuous attendance at preschool education, and parental consent to participate in research. The exclusion criteria were unwillingness to continue cooperation and absence of more than 3 sessions per month. A total of 10 children participated in the control group and 22 children participated in the intervention group (16,17). The intervention group received the intervention program for their next season and the control group received casual education in kindergartens. Before the intervention and once after the intervention, the two groups were assessed by the Gresham and Elliott Social Skills Rating System and Behavioral rating inventory of Executive Functions.

Research instruments

A) Behavioral Rating Inventory of Executive Functions: This inventory was developed by Gioia and Isquith to assess the executive functions of kindergarten children based on their behavioral performance. It is been used for the age range of 2 to 5 years and 11 months. This questionnaire has 63 items and each item is a description of the child's behavior in the environment. The respondent is either one of the parents who live with the child or his/her mentors or teacher who have sufficient familiarity with the child. This inventory has 5 subscales: inhibition, shift, emotional control, working memory, and organization/ planning. These 5 scales are combined and the three scales of the second level constitute, inhibitory self-control, flexibility, and metacognition. Finally, the sum of all subscales creates a global score of executive functions (14,18,19).

The validity and reliability of this questionnaire have been reported as desirable in foreign studies. In Iran, it was translated into Persian by Abdollahipour et al. in 2016, and its face validity was reported to be desirable (20). They examined the questionnaire and found that the validity and reliability of the questionnaire are desirable for use in Iran (21).

B) Gresham and Elliott Social Skills Rating System: This questionnaire has two forms of educators and parents that assess the social skills of kindergarten children. This questionnaire has internal factors of social skills, behavioral

problems, and academic performance. This questionnaire is for educators of children to grade it according to the child's behavior (22). The validity and reliability of this questionnaire are desirable in foreign studies and Iran, it has been translated into Persian by Abbasi Esfjir and Khatibi and it has been examined by factor analysis. The results confirmed the factor structure of the questionnaire as well as its favorable validity.

In addition to factor analysis, Cronbach's alpha was calculated for this questionnaire which was 0.93 for the social skills factor and 0.87 for behavioral problems (23,24).

After the intervention and data collection, the data were entered in SPSS 23 software and the effectiveness of the intervention was evaluated using the Mann-Whitney and Wilcoxon tests.

Results

In term of demographic variables, the control group has 10 children and all of whom are girls aged 6.10 ± 0.31 years and the intervention group has 22 children, 7 boys, and 15 girls with the mean age of 6.41 ± 0.66 years. Shapiro-Wilk test was used to check the normality of data distribution. The test results showed that almost all variables do not have a normal distribution. Due to the non-normality of the data distribution and therefore we used the non-parametric tests.

First, the homogeneity of the variables before the intervention was examined by the Mann-Whitney test, to be aware of any differences between the data of the intervention and control groups, and then the Wilcoxon test was used to examine the changes in both groups before and after the intervention (Table 1).

Table 1. Social skills and executive functions before intervention

Variable		Group	M rank	U statistic	P
Social skills	Cooperation	Intervention	9.5	40	0.35
		Control	11.5		
	Assertiveness	Intervention	11	45	0.36
		Control	10		
	Self-control	Intervention	10	45	0.30
		Control	11		
	Behavioral problems	Intervention	9.4	39	0.16
		Control	11.6		
Executive functions	Working memory	Intervention	18.86	58	0.03
		Control	11.30		
	Planning	Intervention	17.23	94	0.51
		Control	14.90		
	Emotional control	Intervention	15.93	97.5	0.61
		Control	17.75		
	Inhibition	Intervention	16.93	100.5	0.70
		Control	15.55		
	Shift	Intervention	17.55	87	0.35
		Control	14.20		

According to the results of the Mann-Whitney test, it can be seen that none of the social skills variables at the beginning of the study in the two groups have a significant difference and the similarity of the two groups at the beginning of the study in social skills can be accepted.

The results in Table 1 show that only working memory at the beginning of the study was different in the two groups, and other variables did not show a significant difference between the two groups.The social skills before and after the intervention were compared in groups (Table 2).

Table 2. Social skills before and after intervention

Group	Variable	W statistic	P
Intervention	Cooperation	-2.20	0.03
	Assertiveness	-1.72	0.09
	Self-control	-1.99	0.06
	Behavioral problems	-0.56	0.59
Control	Cooperation	-0.18	0.94
	Assertiveness	-0.07	0.84
	Self-control	-0.35	0.82
	Behavioral problems	-2.67	0.004

Table 2 presents that the cooperation of social skills in the intervention group has changed significantly, and assertiveness and self-control have changed, but their changes during intervention have not been significant. In addition, in the control group, none of the social skills had not significant improvement. Only the behavioral problems had a significant change. According to Table 3, all executive functions in the intervention group except emotional control before and after the intervention were significantly different.

In addition, none of the executive functions in the control group had a significant change at the beginning and end of the study.

Table 3. Executive functions before and after intervention

Group	Variable	W statistic	P
Intervention	Working memory	-2.99	0.002
	Planning	-2.88	0.002
	Emotional control	-1.83	0.067
	Inhibition	-2.73	0.005
	Shift	-2.61	0.008
Control	Working memory	-1.57	0.15
	Planning	-0.73	0.62
	Emotional control	-1.62	0.18
	Inhibition	-1.21	0.31
	Shift	-1.62	0.18

It can be seen that although the skill of cooperation in the control group has changed significantly, the amount of these changes compared to the control group at the end of the intervention does not show a significant difference. Despite the large difference, the amount is not large enough to be significant.

Table 4. Executive functions and social skills after intervention

Variable		Group	M rank	U statistic	P
Executive functions	Working memory	Intervention	17.39	90	0.43
		Control	14.55		
	Planning	Intervention	15.70	92	0.48
		Control	18.25		
	Emotional control	Intervention	15.30	83	0.28
		Control	19.15		
	Inhibition	Intervention	16.26	104	0.82
		Control	17.10		
	Shift	Intervention	15.59	90	0.43
		control	18.50		
Social skills	Cooperation	Intervention	12.4	31	0.165
		Control	8.6		
	Assertiveness	Intervention	12.8	27	0.08
		Control	8.2		
	Self-control	Intervention	12.75	27	0.08
		Control	8.25		
	Behavioral problems	Intervention	12.65	28	0.10
		Control	8.35		

According to Table 4, it can be seen that despite the significant changes in executive functions and social skills, the amount of changes at the end of the intervention between the two groups in any of the subscales of executive functions is not significant. It can only be said that the effect of the intervention, despite being significant before and after the intervention, is not large enough to make a statistically significant difference between the two groups after the intervention.

Discussion

The results of this study, despite differences in tools used, are consistent with previous studies, including Otterborn et al. in 2019 (24), and another study by Papadakis and Kalogiannakis in 2019 (25) to evaluate the introductory programming course for teachers. Preschoolers in Greece used Scratch software in a 13-week course with 3 hours per week. To assess the amount of learning and the effect on cognitive components, they used Dr. Search online assessment. The results showed that children learned well and improve their skills.

Otterborn evaluated 199 preschoolers in Sweden and found that the purpose of teaching coding in preschools was to introduce them to this skill and to improve children's cognitive level. The findings are consistent with current study findings (24).

Papadakis and Kalogiannakis, examined the effect of coding training using Scratch software, their findings indicated that the use of coding improves skills (25) which is fully consistent with the findings of the present study. Regarding social skills, due to the specificity of training for these skills, the improvements in skills are compatible with prior studies (26). In 2019, Sheehan et al. examined the factors affecting children's learning from digital media and resources and the effect of parent-child interaction on these factors.

In this study, 31 parents with their children participated to complete a coding training course. Findings show that staying focused on the activity that is being done is the most important factor in learning to code, and in addition, proper parent-child interaction enhances this learning of children from digital sources, especially coding by simple software (27). Considering that the intervention, which included teaching social skills, thinking, and coding, it is expected that the sections of teaching social skills and thinking directly and coding indirectly affect on social skills. The findings were consistent with an improvement in the cooperation of social skills in the present study, but other aspects of social skills, including assertiveness, self-control, and behavioral problems did not show significant improvement. Self-control had a near-significant probability change since both social skills and thinking interventions are done in grouping activity, so its effect on improving cooperation is acceptable. The ineffectiveness of intervention on other social skills can be caused by a defect in the correct transmission of concepts as well as insufficient training time for teachers.

Regarding the executive functions, it is expected that coding training is directly related to the executive functions and training in executive skills and thinking is indirectly related to the executive functions. Due to the nature of coding, which involves writing different parts of the code and then executing it and receiving the result, its effectiveness on planning and inhibition until the end of writing all the code is clear. The shift is one of the criteria for cognitive flexibility, so it is expected that the variety in coding has improved cognitive flexibility, and thus the shift in children has improved.

In addition, there were limitations. The most important of which are the short and intensive training time for teachers, which may have reduced the quality of the concept transferring, the existence of other training programs for teachers that pay less attention to the main program was presented and the sampling was gathered by the convenient sampling method, which caused the control group to be all girls although the difference between girls and boys in studied variable not significant in this study. For caution it is suggested that in the continuation of the study and implementation of the training program, the time of the workshops for the teachers be increased and the intensity of workshops be reduced and other training programs for teachers should be stopped by other organizations to increase the focus on the current training program.

In addition, increasing the sample size can provide better analytical power for the data analysis.

Conclusion

Based on the results, intervention in kindergarten age using social skills, thinking, and coding can improve the cooperation of social skills and planning, inhibition, and shift from executive functions.

Finally, based on available resources these skills can reduce the economic and personal context of crime.

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