



Original Article

Relationship between a Child's Cognitive Skills And the Inclusion of Age Appropriate Toys in the Home Environment

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ABSTRACT

Background: With respect to the significance of toys, playing, and the home environment on children's development, the present study investigates the relationship between gross motor and fine motor toys existing at home and in the home environment, with child cognitive skills such as problem-solving, communication, and personal-social skills.

Methods: This cross-sectional study was conducted with the participation of 140 mother-child couples (children between the ages of 18 and 42 months of age) randomly selected from the healthcare centers of the city of Shiraz. Employing the questionnaire of the Affordance in the Home Environment for Motor Development-Self Report (AHEMD-SR) and the Ages & Stages Questionnaires®, Third Edition (ASQ-3™), both of which have validity and reliability in Iran, the required data were collected, the relationship between children's cognitive development was evaluated by ASQ, and the toys and the home environment evaluated by AHEMD-SR was calculated by the Pearson correlation coefficient.

Results: Studying the relationships revealed that playing with toys related to gross movement stimulation have weak correlations with all three skills of the ASQ considered in the present study, i.e., communication ($r=0.218$, $P=0.001$), problem solving ($r=0.168$, $P=0.02$), and personal-social skills ($r=0.187$, $P=0.04$). Nevertheless, toys related to fine movement stimulation had very low correlations. In addition, the final score of the AHEMD-SR, including toys and other aspects of the home environment, indicate an important relationship with the personal-social skill item of the ASQ ($r=0.367$, $P=0.02$).

Conclusion: With regard to the findings of the present study, the inside-home space characteristic and playing with appropriate toys may motivate the child's cognitive development. Making parents and healthcare officials aware of the appropriate toys and the home environment, therefore, seems to be necessary.

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Introduction

People's surrounding environments in which activities of their everyday life occur include personal, social, organizational, and physical factors [1]. The physical environment in which a child develops is dynamic and

ever-changing, and has significant effects on the child's development and growth [2]. The role of the environment is so important in the child's development that different theorists, such as Bronfenbrenner and Gibson, have theorized the issue. Bronfenbrenner describes his approach as a biological model. Bronfenbrenner's Ecological Systems Theory considers a person who develops in a complicated system of relationships, where several levels of his/her surrounding environment affect him/her. These levels are, namely, the microsystem,

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the mesosystem, and the exosystem. In the Ecological Systems Theory, therefore, development is neither controlled by environmental conditions, nor guided by internal tendencies, but both the individuals and the environment construct a network of correlated effects. Gibson and Gibson believe that the environmental factors existing in the child's world motivates them and provides rich environmental information for them [1].

Motor skills provide children with opportunities for more exploration of the environment, and therefore, they can increase their cognitive and social skills [3]. Playing provides children with opportunities for exploration, and the achievement of knowledge and skills, and brings about a reinforcement of children's social interactions. Playing involves the planning, problem-solving, and cognitive skills of children; these involvements are important for learning. Play-based learning is effective for the facilitation of the advancement of children's skills and their cognitive achievement [4,5]. Toys are an aspect of the physical environments of children and they are thus influential on their development and growth. The existence of toys stimulating development can directly (or by being influenced by motor development) affect children's cognitive development. Moreover, owing to the limitation of the home environment and parents' fear of the lack of safety in the physical and social environment outside home, children may be deprived of active participation while playing. These limitations can lead to introspection and anxiety in children, narrow the manner in which they interact with the environment, create more alienation toward active physical entertainment as well as promote individual and elementary activities, thus resulting in inadequate development across a series of basic skills such as self-confidence and problem-solving while playing with peers as well as an underdeveloped sense of personal security. Paying attention to these limitations and deprivations is one of the specialized areas of occupational therapists [2].

Understanding the factors affecting health, such as training, security, and nutrition at different personal, structural, social, and environmental levels, is one of the tasks of healthcare personnel [6]. Occupational therapists as members of the healthcare group, for example, have significant roles in providing and training appropriate environmental conditions for child development and in increasing children's potentials and abilities via playing and toys appropriate for child development, children's empowerment for participation during play, and the creation of coordination in the child-play-environment for children's success at play as maintaining and developing different skills in children require their participation in play; matching toys and objects in the environment induce maximum participation of children while playing.

In addition, mental health, motion-cognitive development, attachment styles, and parent-child communication patterns, particularly in the first few years after birth, which result in regulating children's physiological performance, and interpreting their emotions and cognitions of social and verbal experiences, and their understanding of themselves, have a close

relationship with their socioeconomic statuses [2]. Socioeconomic factors, such as parents' education, family income, and the number of children, indirectly affects the children's academic achievement via their parents' beliefs and behaviors; these factors can be investigated as aspects of the development environment [7,8]. The necessity of the function of the home environment in the development of the different aspects of children's skills have led to researchers designing different instruments such as The Home Observation for Measurement of the Environment (HOME) Inventory for assessing the degree of children's interactions with their parents at the time of awakening. This questionnaire is related to the supportive aspects of the home and family environment. The Environmental opportunities questionnaire has also been developed for investigating the quality and the diversity of factors in the home environment, which are related to the children's motor development in their first year. In addition, the Affordances in the Home Environment for Motor Development (AHEMD-SR) investigate the degree of affordances of the home environment in motor development. Among the psychometric characteristics, only the AHEMD-SR has been investigated in Iran. All of these questionnaires investigate the home environment in terms of relatively similar aspects such as physical environments, the degree of emotional and communicative stimuli, and the toys existing within the home environment.

Playing and toys are vital subjects in occupational therapy within the domain of child development. The above introduction on the significance of the effect of the home environment on skills development aims to investigate the relationships between a child's cognitive skills, such as problem-solving, making relations, and personal-social skills, and the toys that exist in the home environment. A secondary data analysis seeks to investigate the relationship between the other aspects of the home environment, such as parent-child communication and the physical space of home, and cognitive skills.

Methods

Data Collection

The present study was designed using a cross-sectional and descriptive method. Its population consisted of mothers with children of 18–42 months of age. 140 mothers were selected by a systematic random sampling method from the continuous registry care of children in the healthcare centers of Shoadayeh Valfajr, Enghelab, and Shohadayeh Gomnam in the city of Shiraz (southern Iran). They were then invited to the healthcare centers via telephone call, after it was ensured that the participants met the inclusion criteria. The inclusion criteria were as follows:

- According to the health profiles existing in the healthcare centers, mothers should not suffer from certain medical problems such as diabetes, obesity, or hypothyroidism during pregnancy.
- Mothers should be literate.
- According to the health profiles existing in the

healthcare centers, mother should not suffer from known psychiatric disorders.

- According to the health profiles existing in healthcare centers, the children should not developmentally suffer from medical problems with a specific diagnosis.

- According to the health profiles existing in healthcare centers, the children's head circumferences should be in the normal range, and microcephaly, macrocephaly, or hydrocephaly should be excluded.

To observe ethical criteria, the procedure of conducting the research and its objectives were entirely explained to the mothers and the fathers, and informed consent was obtained from them. The participants' demographic characteristics are presented in Table 1.

Table 1: Demographic information

Child variable	Mean±SD or percentile
Age(month)	28.83±7.15
Sex	54.3%female 45.7% male
Birth body weight (g)	3166.03±490.82
Communication	53.53±10.00
Problem solving	54.48±8.34
Personal-social	52.82±7.17
Mother's age	30.23±5
Maternal education	
≤12years	45.7%
>12years	54.3%

Data Collection

Affordances in the Home Environment for Motor Development-Self Report (AHEMD-SR)

Using AHEMD-SR, useful data was obtained from the home environment as well as opportunities that can be responsible for different dimensions of development [9].

The AHEMD-SR consists of 67 items including five sub-components of outside space with 6 items, 12 items in the inside space, a variety of stimulations with 16 items, fine motor toys with 17 items, and gross motor toys with 11 items [10].

Subcomponents of the home environments included yes/no questions; items of the subcomponent of the variety of stimulation used the Likert scale. In the case of the set of motor toys, parents scored items by observing images of toys and determining the number of similar toys existing in the home environment.

This questionnaire was developed for different age ranges for measuring the supportive aspects of the home environment in child motor development. It is accessible in several languages via the following website: http://www.esepvc.pt/*dmh/AHEMD-SR-SRAHEMD-SR.htm [10]. Its validity and reliability were investigated in Iran, and they were obtained as 0.75 and 0.89, respectively [11].

The Ages & Stages Questionnaire (ASQ)

For investigating the cognitive development of children in the study, the standard Persian version of ASQ was used. This version enjoys acceptable reliability and validity for the screening of developmental disorders in children. The ASQ is one of the common questionnaires used for investigating child development [12].

It consists of 19 items, covering ages from 4–60 months. The required literacy level for completing the questions is satisfied between the fourth and sixth grades of primary school. Parents' understanding of items can, therefore, be ensured. Completing this questionnaire takes 10–15 minutes. The questionnaire covers five different domains; these include: communication, gross motor, fine motor, problem-solving, and social skills. Each domain evaluates development with six questions about turning points. Parents can answer these questions with the options "Yes", "Sometimes", and "Not yet", and score them as 0, 5, and 10, respectively [13].

Both the ASQ and the AHEMD-SR are self-reporting. They were completed by mothers. The data related to child cognitive development and toys existing in the home environment were obtained by the two questionnaires.

Data Analysis

After collecting the data obtained by distributing the ASQ and the AHEMD-SR mentioned in the last section, the questionnaire scores were analyzed using the SPSS-21 software in order to determine the magnitude of correlation between the variables of cognitive development and the variables existing in the home environment so that the Pearson correlation coefficient could be effective.

Results

With regard to the table of demographic information (Table 1), a number of 140 children aged 18–42 months were selected as participants of the present study. 54.3% of these participants were female and 45.7% of were male. Their average birth weight was 3166.03 g. 54.3% of the mothers held diploma degrees or under-diploma degrees, and 45.7% of the mothers held higher degrees.

To investigate the relationship between personal-social, communicational, and problem-solving skills and the existence of toys in children's houses, the Pearson correlation coefficient was employed. The results obtained from this test are presented in Table 2. As observable from this table, the mean scores of the sub-items of the questionnaire and the final score are presented. In investigating the aforementioned relationship, it was identified that the gross motor toys have a significant correlation with all the three skills considered in the present study. With regard to fine motor toys, however, no significant correlation was observed. According to the analysis of the data obtained from the AHEMD-SR, less than 50% of families among the studied families have most of the fine motor toys accessible for children. A considerable number of children, therefore, did not play with important toys such as lacing cubes, boards and large colored beads, peg boards, simple matching toys, pop-up-toys such as Jack-in-the-box, multi-activities tables and apparatus, and large plastic bricks.

In addition, the final score of this questionnaire for children aged 18–42 months indicates an important relationship with the personal-social skill item of the ASQ.

In investigating the relationship between children's

Table 2: The mean scores and the SD of the items of the AHEMD-SR-IS and their relationship with the scores of the cognitive items in the ASQ.

AHEMD-SRsubcales	AHEMD-SR Mean±SD	Spearman ratio		
		ASQ subcales		
		Communication	Problem-solving	Personal-Social Skills
Inside space	6.78±1.91	0.193* P=0.04	0.272** P=0.001	0.078 P=0.22
Outside space	3.94±2.51	0.037 P=0.6	0.075 P=0.8	0.047 P=0.17
Variety of Stimulation	8.47± 0.86	0.128 P=0.77	0.135 P=0.11	0.024 p-value=0.11
Gross motor Toys	24.38±11.40	0.218** P=0.001	0.168* P=0.02	0.187* P=0.04
Fine motor Toys	20.74±9.79	0.040 P=0.81	0.259 P=0.12	0.313 P=0.06
Total score	10.94±1.95	0.056 P=0.6	0.174 P=0.3	0.367* P=0.02

*Correlation is significant at the .05 level

gender and the cognitive-communication skills in the degree of accessible toys, the independent t-test was used. The results of this test are presented in Table 3.

In comparing the scores of the development of the cognitive, social-personal, and problem solving skills in the two male and female groups as shown in Table 3, the results indicated that the female group achieved higher scores in terms of communication than the male group. This difference is statistically significant ($p=0.003$), but gender did not correlate with the number and the type of toys existing among the participants of the present study.

Discussion

Previous studies have indicated that children's social development has a relationship with the type and the number of toys and books that they possess. For example, 21-month children who participated in Tomopoulos' study and were exposed to books and communication-social toys, enjoyed better social and speech skills than the control group [14]. Furthermore, a longitudinal study in 2001 investigated the impact of mothers' playing with their children and the start of children playing with toys on the development of language learning and social skills. The results indicated that social skills have a relationship with the start of using toys in children [15].

Moreover, the results indicated that in the health sector, playing and using toys are effective in improving the cognitive skills of patients suffering from disorders such as Alzheimer's disease [16].

In the present study, the correlation between the number and the type of toys, and the cognitive levels of 18-42 month children was investigated. The main research question was "Is there any correlation between the number and the type of toys accessible to children, and the degree of their cognitive development? The results obtained from analyzing the data confirm the results of the previous studies and the fact that by enriching children's home environments, and creating more opportunities and challenges, the grounds and stimuli for child development can be provided in different fields. According to Diana L. Bantz, a toy is a fundamental tool for social and cognitive development, and fine and gross skills [17].

The present study indicated that in the space inside the home in which children grow and toys are accessible to them, gross motor toys in particular, have a significant correlation with communication, problem-solving, and personal-social abilities, which are related to the domain of cognitive development.

The AHEMD-SR divides gross motor toys into the following categories: real material, musical toys, gross manipulation, and locomotor material toys. These selection and diversity of gross motor toys, which the questionnaire introduces to families, can be a good foundation (factor) for creating symbolic plays in children, and have an important effect on the creation and the development of the communication skill. In addition, fine motor toys are divided into three classes; these are: replica toys, educational toys, and other toys. As mentioned in the Results section, most types of fine motor toys are accessible by less than 50% of all the participants. It seems

Table 3: The mean differences between the male and the female participants in two variables

Variables	Girl	Boy	Sig(t-test)
	Mean±SD	Mean ±SD	
AHEMD-SR			
Total	64.1974±14.73	64.5000±16.12	0.458
Toys (Fine motor)	20.2763±9.62	21.2969±10.04	0.543
Toys (Gross motor)	24.8158±11.15	23.8750±11.74	0.630
Toys (Stimulation)	8.3553±0.85	8.6250±0.84	0.064
ASQ:			
Problem solving	54.7368±7.43	54.1875±9.37	0.705
Personal-social	52.9605±7.21	52.6563±7.18	0.804
Communication	55.7895±6.93	50.8594±12.26	0.003

that owing to children's inaccessibility to the mentioned toys, no significant correlation was observed between them and the children's cognitive development. Parents' unawareness with regard to theselection and purchase of these types of toys that are appropriate for the child's age, and the inaccurate use of these toys by children and parents as well as the lack of communicationwith others during doing play can be among the factors contributing to the low score of children's cognitive development.

In the present study, it was identified that the level of cognitive development in children under the age of 42 months was related to the scores obtained from the AHMD-SR. As the results indicate in Table 2, for stimulating gross movements, toys are related to the three skills of cognitive development we measured in our research. It is, therefore, important to mention that parents should make good opportunities for gross movements of their children instead of sedentary table-based activities or allowing them to watch TV. They are also advised to use toys that stimulate fine movements; these can be effective for cognitive development. Today, studies show that families can manipulate child development by a few changes in the learning material that they purchase for their children as well as their home space; therefore, they need to be more aware of these opportunities.

According to what was mentioned in the descriptive study conducted by Clavio, introducing parents to common toys and training them on how to use these toys can increase problem-solving skills in children [18].

The differences of human beings in terms of gender are an important issue in all aspects of everyday life. According to the social-cognitive theory of development and sexual differentiation, the concept of gender and functions are the results of a vast range of social effects directly acting in different types of sub-systems [19].

The differences in the communication skills of male and female participants may be a result of the difference in parents' treatment of boys and girls, which is related to both the culture and the natural differences in the way in which boys and girls are attached to their parents. This result has been mentioned in previous studies.

According to the results of the studies conducted on 32 girls and 32 boys, the observation of the mothers' behaviors around their children indicated that the different behaviors extant among girls and boys are the result of the differences in their mothers' behaviors with them [20]. In addition, Fathers tend to differentiate more than mothers between boys and girls (21).

Gender did not correlate with the number and the type of toys among the participants of the present study. Consequently, the difference can be sought in the development of the communication skills brought about by intrinsic differences.

Conclusion

Since certain fine motor toys were not available for more than 50% of the participants of the present study as well as keeping in mind the effect of gross motor toys on children's skill patterns, parents' awareness of the

necessity of these toys at home and an emphasis on using them in the form of training workshops seems necessary.

Considering the mentioned discussions, the present study provides suitable information for families to make the right choices while selecting the type of toys and preparing them. In addition, this information can help healthcare officials care for and improve of the situation of children whose cognitive development levels are lower than the normal level as well as offer more suitable advice to families.

Limitations and Suggestions for Further Research

The process of performing this research was prolonged owing to the lack of cooperation from certain parents or healthcare centers.

In further research, parents' ideas about toys can be qualitatively investigated. Furthermore, more investigations can be conducted on the difference in the degree of the effects of fine and gross motor toys on children's development.

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