

Cognitive home environment of infants, toddlers and preschoolers: A study from a hospital setting

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Abstract

Aim: The purpose of this study was to determine the Cognitive Home Environment (CHE) of young children who apply to the hospital for various reasons.

Material and Methods: In total 121 mothers participated. CHE was measured by The StimQ – (Infant, Toddler and Preschool) Home Environment Assessment Tools and sociodemographic characteristics of the families were noted.

Results: Averages of total StimQ scores were lowest in Infant Group (IG) with 13.7 points out of 43; 15.9 points out of 39 in Toddler Group (TG); 27.78 points out of 49 in Preschool Group (PG). There was a significant difference in the Total StimQ scores of mothers with high level of education in Toddler ($p=.005$) and Preschool ($p=.000$) groups. Looking at childrens' books increased with age. Only 15% of the mothers in the IG, 32.5% in the TG, and 90% in the PG were looking at children's books with their children.

Conclusion: The CHE of young children is not enough to serve for optimal development, especially the infants. High maternal education is effects CHE positively. Applying STIMQ can be a good opportunity to explore CHE of children in hospital settings.

Keywords: Cognitive home environment; early childhood; StimQ

INTRODUCTION

The early years of life is an essential period for brain growth and child development, with the potential to influence later social, economic, and health-related quality of life (1). Research on early brain development reveals that the child is influenced strongly by his/her interactions with surroundings and experiences in this period (2). On the strength of literature on parenting, it is clearly indicated that parents are one of the most important factors in children's development (3). Parenting practices are significant modifiable aspects of a child's home environment that can be targeted to support early child development (4). Social interactions organized with responsive toys, age-appropriate materials, and exposure to reading materials form the cognitive environment that parents can provide (5). A cognitively enriched home environment combined with sensitive and responsive parenting in early childhood is predictive of a child's cognitive, early language, and social-emotional development along with future educational achievement (6). Variations in the early home environment connected to the quantity of cognitive stimulation provided by parents, like reading, teaching, and verbal responsiveness, define much of the difference

in child developmental outcomes (7,8). For this reason, attention has been drawn to supporting parenting skills of parents of young children during the period of early child development (9).

The hospital settings have the potential to provide low-cost interventions supporting parenting practises that can be applied population-wide in early childhood and preschooler (10). The American Academy of Pediatrics (AAP) has recommended that pediatricians should provide guidance to parents about appropriate choice of toys and incorporate literacy promotion into primary care (11). Hospital visits seem to be an opportunity for disadvantaged children and their mothers for assessing mother-child interaction and cognitive home environment, offer an appropriate platform to disseminate parenting support, and show promise in enhancing parenting behaviors that promote early child development (10). Pediatric-based supporting practises, that include parents from low-income families and mostly a team of health professionals including child development specialists, showed positive effects on developmental outcomes of toddlers by encouraging parenting through play and reading (6).

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Not only socioemotional supports that parents provide for their children but also parents' sensitivity to the environmental needs of their children in the course of everyday learning is advised to describe, understand, predict and influence children's development. Home Observation for Measurement of the Environment Inventory (HOME) has been widely used for measuring parenting sensitivity for more than forty years successfully (12). But the requirement of a home visit, cost and trained staff are barriers for using it in applied settings. Home Screening Questionnaire (HSQ) and Pediatric Review and Observation of Children's Environmental Support and Stimulation (PROCESS) have been developed as office-based assessment tools, but because of the limited usefulness of these instruments, STIMQ has been developed to attend the benefits of these two instruments by Dreyer, Mendelsohn, Tamis-LeMonda and their co-workers at New York University. StimQ is a unique tool for researchers working in hospitals to support child development, as it is able to evaluate patients without going home, cover children up to 6 years, is a valid and reliable tool and is made for low-income families (5).

We have planned this study to reveal the cognitive home environment (CHE) of the children with StimQ, which has never been used in our country before. The primary objective of the current study was to explore the CHE of children who apply to the hospital.

MATERIALS and METHODS

The study was carried out in 2017 April - November at Inonu University, Developmental Pediatrics Unit, in Malatya, Turkey. A total of 121 mother-child dyad (inpatient, n=43 and outpatient, n=78), were randomly included in the study. Twin births, long-term hospitalization and intensive care patients were excluded from the study.

The interviews were conducted face-to-face, by child development specialists, in Developmental Pediatrics outpatient clinic and inpatient rooms of child services. The interviews lasted 20 minutes on average. In order to better understand the questions of STIMQ, a picture album was created by the researchers and the pictures of the toys and other materials mentioned in the questions were shown.

Interview Tools

Demographic Information Form, and StimQ (Infant, Toddler and Preschool) Home Environment Assessment Tools were used in the study.

Demographic Information Form

Through the demographic information form prepared by the researchers "gender of children, age of children, child order, maternal education, maternal age, mother employment" were learned.

Cognitive Home Environment was assessed using StimQ, a questionnaire designed for use in research and clinical settings that is based on a structured interview with the child's caregiver. StimQ is validated for use in low-income populations and does not require a home visit (5). The permission for translation of the original

English version of StimQ to Turkish and the use for clinical purposes were obtained from Alan Mendelsohn. StimQ was translated by two people who knew English well and then translated back by another person who did not know about the instrument.

StimQ comprises 4 subscales

1. Availability of Learning Materials (ALM) assesses provision of developmentally appropriate toys.
2. READ assesses shared reading activities. Items assess frequency of reading activities, number of books in the home, and diversity of content of books shared with the child.
3. Parental Involvement in Developmental Advance (PIDA) assesses the frequency and quality of teaching activities parents engage in with their children.
4. Parental Verbal Responsivity (PVR) assesses verbal interactions between parents and their children.

StimQ has been found to have excellent internal consistency (Cronbach's alpha 0.88 to 0.93), convergent validity with the HOME inventory, and predictive/concurrent validity with language scores, including for its subscales (5).

We made some changes on the StimQ for easier understanding and adapting to our culture:

1. We changed the listed finger games in the form and wrote our own traditional or well known finger games instead.
2. We merged under the name of "coloring pencils" the paints that are found in Art section in Toddler and Preschool form -crayons, magic marker set, finger or water paints.
3. The items about CD/record players and CD's that are found in Toddler's and Preschool's language sections were merged.
4. We added our own traditional or well known books to the book samples which were listed at item 11 of Preschool's form.
5. We created a photo album which shows the StimQ toys and wrote the same item's number on to photographs. We showed this album to the families when we were interviewing so that they could easily name the toys they have.

This study was designed in accordance with the principles outlined in the Helsinki Declaration, and was approved by the local Clinical Research Ethics Committee of our institution.

Ethical approval: Inonu University, Clinical Research Ethic Committee approved the study. Approval date and number: 06.06.2017, 2017/12-12.

Statistical Analysis

Statistical analyses were performed using "Statistical Package for Social Sciences (SPSS 17)" package program. In the power analysis of the study, when alpha and 1-beta

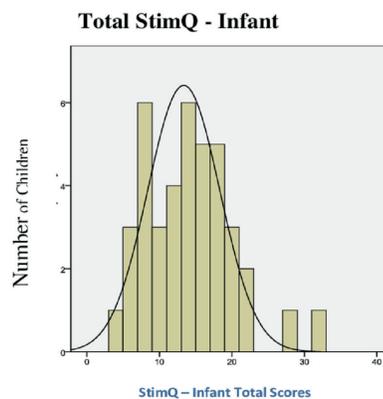
(power) were accepted as 0.05 and 0.80, it was calculated that at least 97 people should be included (4.4.2017, Medical Statistics).

The Shapiro-Wilk test was used to determine the normal distribution. Independent Samples T test and Mann-Whitney U test were used to test the differences. Mean and standard deviation values were used as descriptive statistics. The results were considered statistical significance if p values were less than 0.05.

RESULTS

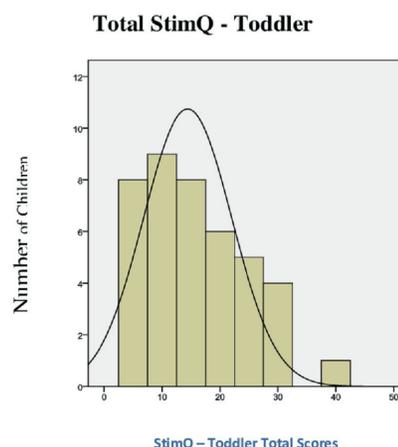
A total of 121 mothers participated to the study. Mothers were divided into three groups according to age of their child who had been considered in the StimQ (Infant, Toddler, Preschool). Mean age of children were as follows: StimQ – Infant 8.23 months ± 2.3, StimQ – Toddler 22 months ± 7.6, StimQ – Preschool 50.2 months ± 8.9. Demographic characteristics of the sample is shown in Table 1.

Table 1. Demographic characteristics of analytical sample	
	N (%)
Gender of children	
Female	44 (% 36.4)
Male	77 (% 63.6)
Percentage of participants by the groups	
Infant	40 (% 33.1)
Toddler	41 (% 33.9)
Preschool	40 (% 33.1)
First born child	52 (% 43)
Maternal age	
< 25 yr.	20 (% 16.5)
25 – 35 yr.	72 (% 59.5)
> 35 yr	29 (% 24)
Maternal education	
Illiterate	5 (% 4.1)
< 9 grade	48 (% 39.7)
9– 12 grade	28 (% 23.1)
>12 grade	40 (% 33.1)
Employed mother	36 (% 29.8)
Do you read children books and/or talk about the book's pictures with your child? (Responding as "Yes")	
StimQ Infant	% 15
StimQ Toddler	% 32.5
StimQ Preschool	% 90
How many days of the week you read the children books and/or talk about the book's pictures with your child? (Responding as "4-to-7 days in a week")	
StimQ Infant	% 10
StimQ Toddler	% 14.7
StimQ Preschool	% 37.5



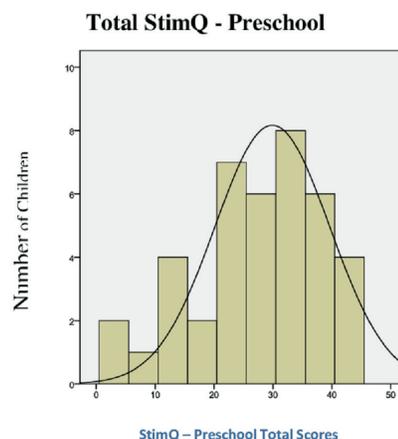
Total StimQ- Infant (n=40), Mean scores of Infant = 13.7 ± 6, Min.-Max Scores Infant= 4-31 (out of 43)

Figure 1. Histogram showing distribution of scores of



Total StimQ- Infant (n=41), Mean scores of Toddler = 15.9 ± 8.5, Min.-Max Scores Toddler = 5-39 (out of 39)

Figure 2. Histogram showing distribution of scores of



StimQ- Preschool (n=40), Mean Scores of Stim Q - Preschool = 27.8 ± 11.1, Min.-Max Scores of Preschool = 3-45 (out of 49)

Figure 3. Histogram showing distribution of scores of

Cronbach's alpha values ranged from 0.80 to 0.90. 53 items of StimQ – Infant, 62 items of Toddler and 75 items of Preschool were positively correlated with the overall StimQ scores and Cronbach's alpha values were determined as 0.90, 0.89 and 0.80 respectively.

STIMQ SCALE SCORES

Among the groups, it was found that the highest Total StimQ score was obtained by the preschool group. Maximum, mean, SD, minimum scores of all groups are shown in Figure 1,2,3.

Differences in StimQ Subscale Scores by Demographic Groups

Gender of children

There was no significant difference between the genders in the infant group. In Toddler and Preschool groups, Availability of Learning Materials (ALM) (Toddler $p=.009$, Preschool $p=.01$), Parental Involvement in Developmental Advance (PIDA) (Toddler $p=.04$, Preschool $p=.04$) and Total StimQ (Toddler $p=.01$, Preschool $p=.03$) scores of girls were significantly higher.

Birth order

There was no significant difference by the order of birth in the Toddler group. But Parental Verbal Responsivity (PVR) scores of the Infant group ($p=.01$) and PIDA scores of the

Preschool group ($p=.01$) were significantly higher in first-born children.

Higher maternal education

There was a significant difference in the Total StimQ scores of mothers with high level of education in Toddler ($p=.005$) and Preschool ($p=.000$) scales.

ALM Subscale scores of the mothers with a high level of education were found to be significantly higher in all StimQ scales (Infant $p<.05$, Toddler $p=.005$ and Preschool $p=.000$). READ (Reading-Verbal Subscale) and PIDA Subscales scores were significantly higher in Toddler (READ $p<.05$, PIDA $p<.01$) and Preschool (READ $p<.01$, PIDA $p<.01$) scales in this group. The PVR Subscale score ($p=.003$) was found to be significantly higher in Preschool Scale in this mother group (Table 2).

Mother employment

ALM (Infant $p=.01$, Toddler $p=.004$, Preschool $p=.000$), READ (Infant $p=.000$, Toddler $p=.000$, Preschool $p=.002$) and Total StimQ scores (Infant $p=.004$, Toddler $p=.000$, Preschool $p=.000$) with employed mothers were found to be significantly higher in all groups. Also PIDA (Toddler $p=.000$, Preschool $p=.01$) and PVR scores (Toddler $p=.02$, Preschool $p=.01$) of the Toddler and Preschool groups were significantly higher in the employed mothers.

Table 2. StimQ Subscales and Total Scale Scores

	ALM	READ	PIDA	PVR	StimQ Total	Do you read the children books with your child?	
Maternal education \geq 9 grade (n = 20)	< .05	.349	.476	.056	.059	.38	StimQ – Infant
Employed mother (n=6)	< .05	.000	.817	.103	< .01	.000	
Child gender							
Female (n=17)	.537	.644	.472	.245	.661	.691	
Male (n=23)							
First born child (n = 16)	.586	.673	.974	< .05	.323	.592	
Second or later born child (n = 24)							
Maternal education \geq 9 grade (n = 23)	< .01	< .05	< .01	.528	< .01	< .05	StimQ – Toddler
Employed mother (n=12)	< .01	.000	.000	< .05	.000	< .01	
Child gender							
Female (n=17)	<.01	.08	<.05	.245	<.05	.147	
Male (n=24)							
First born child (n = 18)	.805	.198	< .05	.395	.148	.224	
Second or later born child (n = 23)							
Maternal education \geq 9 grade (n=25)	.000	.000	< .01	< .01	.000	< .01	StimQ – Preschool
Employed mother (n=18)	.000	< .01	< .05	< .05	.000	.06	
Child gender							
Female (n=10)	<.05	.172	<.05	.199	<.05	.100	
Male (n=30)							
First born child (n = 18)	.499	.326	< .05	.064	.124	.834	
Second or later born child (n = 22)							

DISCUSSION

The main findings of this study, which was performed for the first time in our country in a hospital setting and evaluated the CHE of three different age groups with StimQ, are as follows:

1. StimQ total scores were highest in preschool group and lowest in infant group.
2. StimQ total and subscale scores (ALM, READ, PIDA, PVR) decreased as mothers education decreased.
3. Picture books were never looked together with more than half of the children, and the rate of looking at books decreased as the child gets younger.

StimQ Infant and Toddler total scores were less than half of the total score, supporting the hypothesis of our study. It was slightly higher than half of the total score in the Preschool group. The most striking result of our study was that as the age of the children decreased, the stimulation and developmental support given to them also decreased. Researches done with StimQ has been mostly intervention and controlled studies especially with infant and toddler groups. Mendelsohn et al. conducted two studies to determine the pediatric primary care intervention on parent-child interactions in the families with low SES in the Bellevue Hospital Center. Considering only families in the control group, in the first study, which included 134 children aged 6 months old, the mean StimQ Infant score was 16.4 (7.0) (13) and in the second study of 33 month olds, the mean StimQ Toddler score was found to be 21.7 (7.5) (14). Similarly, in a controlled study that was done by Green with low-income mothers who have 6-month-old children, the StimQ mean score was found to be 17.7 (6.8) in 206 children (15). In their study, Malhi et al. compared the cognitive development and CHE outcomes of 150 children aged 12-30 months in India. Total StimQ Toddler scores were found to be 9.27 (5.84) in children with cognitive delay and 17.83 (8.11) in children with normal development (16). Although the studies were different, the StimQ Infant total mean scores were 3-8 points lower in our study than the control groups in the USA, and the StimQ Toddler total mean scores were about 2 points lower than in children with normal development in India.

Low maternal education level, which is considered as one of the most important risk factors in child development, was also associated with low StimQ scores in our study. Mothers with more than 9 years of education received higher StimQ total and subscale scores than mothers with low education. Camp et. al. studied the CHE and vocabulary of 157 children aged 10-18 months using StimQ in the outpatient department of a children's hospital. Similar to our results, six months after the first evaluation, they found that StimQ PVR subscale scores of mothers with high educational level were high (8). StimQ total and subscale scores of mothers with high educational level were also found to be high in Malhi's study (16).

However, although it seems like a negative situation that mothers' education level can not be improved, studies show that support given to mothers enables them to carry out activities to support their children's development, regardless of their education level. Landry et.al. conducted a three-week home visit to 264 mothers with 6 to 10 month old babies. During these home visits, the target group mothers were supported by the facilitator for interacting and playing with their babies, feeding, and bathing. As a result of the assessments, it was seen that the sensitive approaches of the target group mothers and the social, emotional, cognitive and communicative abilities of the babies were better (17). Camp et.al. found an increase in StimQ scores after providing information support to the mothers about child development in their study (8).

LIMITATIONS

The limitation of this study was that it was conducted in only one center. The strength of the study is that the entire assessment tool was applied to all three groups covered by StimQ in a hospital setting in a low-income country. To the best of our knowledge, researches using StimQ so far has been studied in specific age groups and specific subscales.

CONCLUSION

Our results have practical implications for pediatricians and other professionals working in hospital clinics. CHE can be assessed easily by using StimQ in hospital services and outpatient clinics. Although hospitalization is often a difficult experience, it should be recognized as an opportunity for children and it should be kept in mind that the infant group is inadequate in terms of developmental support. Books were not read together with more than half of the children in both the infant and toddler age groups. This rate is lowest in the infant group and shows that programs like Reach Out and Read in our country should start to be implemented rapidly. After this study, we plan to evaluate the home environment of children with chronic and/or congenital diseases or high-risk children with a history of preterm birth with StimQ.

Competing Interests: The authors declare that they have no competing interest.

Financial Disclosure: There are no financial supports.

Ethical Approval: Inonu University, Clinical Research Ethic Committee approved the study. Approval date and number: 06.06.2017, 2017/12-12.

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