

Enhancing quality of environmental instruction increases the level of psychomotor development in preschoolers

Aurela Saliaj¹, Majlinda Zahaj¹, Afërdita Nikaj¹, Sonila Nikaj¹

¹Department of Mother and Child Care, Faculty of Public Health, University “Ismail Qemali”, Vlora, Albania.

Corresponding author: Aurela Saliaj, MD, PhD;
Address: University “Ismail Qemali”, Vlora, Albania;
Telephone: +355696191305; E-mail: aurela.dai@univlora.edu.al

Abstract

Aim: Children require stimulating and supportive environment for their proper growth and development. Personal environment, family, education and community are all important to a child’s development. This study aimed at exploring the stimulating factors that affect psychomotor development of preschoolers, noting that a better learning and instructing environment improves the psychometric parameters of this group of children.

Methods: This study was conducted in a sample of 249 preschool children in Vlora, Albania. We measured the psychometric parameters of preschoolers with ASQ-3 (Age & Stage Questionnaires-3). The quality of educational environment was assessed with ECERS-R. An instructed program was conducted by special educators with institutionalized children in Foster Care. Subsequently, we assessed the associations between these variables.

Results: The age-group with the highest average development (251-300) was 60 months (57-66 months), while the age-group with the lowest average development (211-300) was the 48 months age-group (45-51 months). The highest development average (267 points) corresponded to 5.1 kindergarten scores. The best settings in all domains were verified in children who had attended the kindergartens for more than three years. Retesting made at the end of development skills instructional program with institutionalized children showed significant improvement in almost all domains.

Conclusion: Our findings from this study conducted in Albania indicate that the preschoolers' psychomotor development is largely determined by incentives offered by the institutional environment.

Keywords: ASQ-3 Questionnaires, instructive environment, psychomotor development.

Introduction

Children require stimulating and supportive environment to well-develop. Personal environment, family, education and community are all important to a child's development. Educational environment, which is also called "third teacher" in Reggio Emilia schools plays one of the most important roles in the education and development of preschool children. When children lack a positive environment in which to learn and grow, they become vulnerable and often need extra support (1,2).

The physical environment supports and extends the capabilities of the child to do things themselves, to care for them, to initiate and complete activities to take control over the actions and responsibilities, communicate and interact with others easily, and have best perceptual skills and motor. Moreover, if the environment where the child is staying is designed wisely, it can encourage elections, discoveries and communication between the child and parent/educator (3). Children who are surrounded at home, even in the nursery / garden, with a strong learning environment that is both informative and supportive, can have a better development. Research has shown that children exposed to a poor and underprivileged environment tend to have a higher risk of being affected negatively in terms of development (4).

Many researchers are trying to understand how the environment affects the child. Various scholars, as Skinner, Piaget and Bronfenbrenner stress the importance of designing and furniture of the educational environment. Skinner suggests that the interaction with the environment is precisely the one that shapes our behavior. According to Piaget, children build their knowledge and skills by working with environmental materials. Through interaction with the environment children are tested, they accept or reject existing knowledge structures. If the child is offered suitable material and toys, he might play, manipulate, experiment with them, in order to understand the world that surrounds and build their knowledge (5).

Skinner and Piaget emphases are not on the environment per se, but how the child interacts with it. The environment dictates the type of behaviors which are appropriate or inappropriate, encourages or discourages exploration, provides feedback for behavior, and creates humor (general state of spiritual) that can range from joyful and enthusiastic to bored or scared. The key to effective intervention by any professional relationship is to understand this and be satisfied that the environment is a tool that can be modified for the purpose of intervention, as a factor to be taken into consideration when deciding realistic expectations for change (5).

Children institutionalized in orphanages represent a population with special needs due to their previous or present trauma (orphaned or homeless), so they are a group at risk for atypical results. Preschool children are a growing part of institutionalized young people. These children have a high degree of morbidity, delays in development and risks for psychopathology (6,7). Not addressing the problems and risk factors of childhood in orphanages increases the risk of children with low level of psychomotor development (6,8-10).

There are several reasons why preschool children seem to have a higher prevalence of psycho-motor problems, compared with younger children. First, children of this age (3-6 years) are expected to have developed emotional-social skills, and conduct more sophisticated, and therefore screening tests have a higher sensitivity in the detection of delays or deviations from normal development. Secondly, as older are the children at the time of their institutionalization, the more complex is expected to be the history of trauma that led to it. Adapting to the new environment is much more difficult than for younger children (8,11).

The real question is not which is the most important, early or late experience – but, how recent experiences are influenced by early experiences? It directs attention to the years of early childhood, not because they determine the welfare as adults, but because what is taught early in life establishes a

set of skills, orientations in the environment, and expectations about how things and people will behave, which then affect how new experiences are selected and processed (12).

In this context, this study aimed at exploring the stimulating factors that affect psychomotor development of preschoolers, noting that a better learning and instructing environment brings improved on psychometric parameters of these children.

Methods

Study population

From the population of preschool children attending kindergartens in the city of Vlora, it was drawn a sample which included 7 of 25 kindergartens (4 public and 3 private) and the Foster Care in this city. There was a random selection of kindergartens which included all of the city areas (downtown and suburbs).

Exclusions from the study: This study excluded children with genetic syndromes, sensory handicaps or diagnosed mental delays.

Description of instruments used

Measurement of psycho-metric parameters was made by the international standardized test ASQ-3 (Age & Stage Questionnaires-3; Jane Squires & Diane Bricker 2009), referred to the chronological age of the children. Tests were conducted at the premises of the institutions where children stay. Most of the tasks of the age group were demonstrated directly by the children, and information about the rest was taken from the reports of educators.

To avoid variation of the measuring instrument, all psychometric measurements were conducted during the morning and from 9:00 to 11:00, from the same person.

Assessing the quality of the educational environment was done through observation of the premises of the institutions, according to the classification system criteria ECERS-R (Early Care Environment Rate Scale - Revised; Harms, Clifford & Cryer, 2005). Assessment of quality of care for children in the

institution, according to the result is as follows:

- 1 point - unacceptable
- 3 points - enough,
- 5 points - well,
- 7 points - excellent

Statistical analysis was conducted with the Statistical Package for Social Sciences (SPSS Statistical Package for Social Sciences, version 17, Inc., Chicago, Illinois). Differences between variables were analyzed through Fisher's exact test. Links between phenomena were analyzed by the technique of correlation using Pearson's correlation coefficient. The reports of the likelihood (OR), confidence intervals (95%CI) and the p-values across different subgroups were calculated and were presented in tables. It was considered statistically significant a p-value ≤ 0.05 .

Ethical considerations

Ethical consensus was required from the preschool institutions and from the tested children's parents. Clarification about the importance of children's psycho-motor assessment, potential benefits they could have from this study, and assurance about anonymity and confidentiality increased the response rate.

Results and Discussion

In this study were examined all children who attended the selected institutions, which in total comprised 249 preschoolers.

Psycho-motor development by age-groups of children

Table 1 presents the percentages and averages of development delays among children attending kindergartens in the study, according to ASQ-3 age groups. The age-group with the highest average development (251-300) was 60 months (57-66 months), while the age group with the lowest average development (211-300) was 48 months age group (45- 51 months). The 54 months age-group (52-56 months) has the best indicators of psychometric delays, with a maximum of 47% of children

without any delay and a minimum of 19% of children ≥ 2 psychometric parameters below the aged. The most problematic indicators in this aspect were found in the 36 months age group

(34.5-39 months) with only 7% of children within the normal development standards and 57% of children with delays in many psychometric domains.

Table 1. The psychomotor delays according to the age-groups

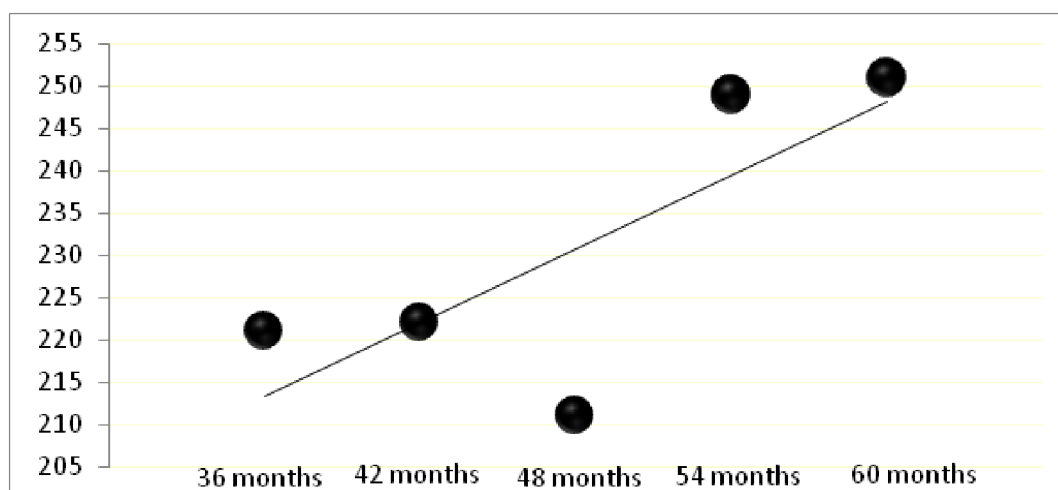
Age-group	Number of children	Communication	Global motor	Fine motor	Problem solving	Personal-social sector	0 delays	1 delay	≥ 2 delays	Development average
36 months	14	4	57	29	43	43	7	29	57	221
42 months	46	24	17	15	31	65	15	46	35	222
48 months	40	23	23	53	48	60	15	25	57	211
54 months	64	6	8	13	22	30	47	34	19	249
60 months	85	29	12	19	28	23	42	27	29	251
χ^2 P-value <0.001							r=0.89, p=0.02	r=0.67 p=0.1	r=0.76 p=0.03	

The 36 months age group has got 57% of children below the cut-off in Global motor, as the most problematic domain. 42, 48 and 54 months age groups have the highest number of delays on the Personal-social domain (65%, 60% and 30%), while the 60 months age group has the worst indicators in the sectors of Communications and

Problem solving, with 28-29% of children who cannot achieve development tasks for their age. In the above results (Table 1), which shows the distribution of psychometric parameters in children by age-group, the following facts can be stated:

- The highest development average is assessed among children of 60 months age group

Figure 1. The trend of change of the average of psychomotor development with increasing age



(57-66 months).

- In general, there is a tendency of increasing the average level of development with age's growth, but the most striking evidence is the obvious difference between the younger age groups (36-42-48 months) and the older ones (54-60 months), from 211 to 221 scores in 249-251 scores. This significant difference is also reflected in the percentage of psychometric delays: from 7-15% of children with typical development in the lower age groups, to 42-47% of children without any delay in the higher age groups. Similarly, the percentages of children with delays in more than one sector are reduced by 35-57% respectively in 19-29%.

This situation is very favorable in the context of preparing children for attending school education, and maybe is the possible reason that explains it: the higher age-groups are working harder and sometimes on individual program to be prepared for the first class. This intensive work (by parents and educators) focused on preschool children is positive and is certainly to be praised, but neither justifies, nor recovers the lack of adequate stimulation to the child beforehand. As we have seen from the study, psychomotor development of preschool children is influenced not only by contemporaneous factors, but also by factors that had acted out in the first months of life, or even in the earlier intrauterine period.

The quality of the educational environment for children in kindergartens

In this study we measured some elements of institutional and family environments in order to assess their impact on psychomotor development of the children. To evaluate the effect of institutional environments were measured the level of educational environment quality, that is offered into kindergartens frequented by children (through ECERS-R), and the duration of preschool attendance.

Assessment of educational environment quality in Vlora's kindergartens showed an average of 4.2 scores in total, which is evaluated between Adequate (3 points) and Good (5 points) and can be considered

not bad for a developing country as Albania. Private gardens have the average ECER-R points higher than the state gardens, respectively 5.1, 4.9, 4.6 and 4.1, 4, 3.7, 3.3 scores, with an average of 4.2 scores for all gardens together. Conversely, the quality environment for children in the Foster Care has an average of 2.9 scores.

If we make a more detailed analysis of the sub-classification, we will see that high ratings are noted in sectors such as supervision of children, allowing leisure activities or the availability of sufficient space and development equipments, which support the Global motor or Fine motor activities (this is reflected in lower rates of delays in these two sectors).

The highest quality educational environment sector with the 5.1 scores is Interactions, which includes general supervision of the children, discipline, interactions between children, etc. The sector with the lowest quality is the sector of Activities with average score of 3.4, which includes fine motor, arts, theater pieces, mathematics, nature / science, water / sand, etc.

Regarding the distribution of psychometric parameters according to the quality of educational environment, the highest development average (267 points) corresponds to 5.1 kindergarten scores. The lowest level of development in kindergartens' children (226 points) coincides with 3.3 kindergarten scores and the lowest level of development (181 points) was observed in children institutionalized in the Foster Care, where quality of educational environment is 2.9 scores.

The correlation between the quality of the kindergartens' environment and the average psychomotor development is strong ($r=0.81$, $p=0.006$), which proves that the higher the kindergartens' quality, the higher the level of children psychomotor development. The same correlation is observed between the quality of kindergartens and percentage of children with typical development ($r=0.82$, $p=0.005$). The correlation between the quality of kindergartens and children ≥ 2 percentage of psychomotor delay is very strong ($r = -0.9$, $p=0.001$).

The data of various studies converge on the fact that the quality of the environment where the child grows affects him on several levels (2,13). One of the most consistent data and ubiquitous literature is the relationship between environmental quality of care in kindergartens and any measurement made for assessing the children development (12,14-18). After the home care environment, educational preschool environment is the most important contexts of children psychomotor development. Kindergarten is the place where the child is provided with nutrition and support to learn and develop. In our country this is often the only instructional upbringing which provides support to the preparation of children for entry into primary school.

Therefore, it is not surprising that numerous studies have found that the higher the quality experiences in gardens, the fewer psychomotor problems have children in later years (14). Many studies in recent years (12,19-21) have found statistically significant relationship between the quality of the educational environment in kindergartens, measured with ECERS classification, and welfare, behavioral problems and psychomotor skills in preschool children. These

associations were still present even when the variables taken into account children and families (21,22).

The attendance's extent of kindergartens

Distribution of psychometric parameters according to the period that children have attended kindergartens is presented in Table 2. The best settings in all domains are verified in children who have attended the kindergartens for more than three years, who represent the highest average development (284 scores) and have no psychometric delay. These results support previous studies on the effects of cumulative experiences on cognitive development among institutions' enrolled children (12,23).

On the other hand the worst parameters are presented by children who have no more than six months of kindergarten attendance. Their development average is 221 scores, only 14% have normal development and 57% have psychometric delays in two or more sectors. The correlation between the duration of kindergarten attendance and the mean value of psychomotor development was: $r=0.9$, $p<0.05$.

Table 2. Psychomotor delays according to the attendance's extent of kindergartens

Years of kindergarten attendance	Number of children	Communication	Global motor	Fine motor	Problem solving	Personal-social sector	0 delays	1 delay	≥ 2 delays	Development average
0.5 year	28	21	21	21	36	75	14	29	57	221
1 year	28	14	18	46	21	50	21	43	36	227
1.5 years	23	30	26	30	37	39	17	39	44	226
2 years	25	24	4	16	33	33	44	20	36	247
2.5 years	12	8	17	17	25	17	42	33	25	249
3 years	8	13	13	13	25	25	38	50	13	249
> 3 years	6	0	0	0	0	0	100	0	0	284
χ^2 P-value <0.001		$r=-0.7$, $p=0.05$	$r=-0.68$, $p=0.04$	$r=-0.75$, $p=0.02$	$r=-0.7$, $p=0.05$	$r=-0.95$, $p=0.0005$	$r=0.8$, $p=0.01$	$r=0.75$, $p=0.01$	$r=-0.95$, $p=0.0005$	$r=0.9$, $p=0.001$

In the Personal-social domain, 50%-75% of children who have only 6 months to maximum 1 year of

attending the kindergartens, don't possess even the minimum of development skills.

These results highlight the necessity of kindergartens' attendance not only for the possibilities of socialization that they create, but also for the opportunity to be independent, to care for themselves and to practice the daily routine, the possibility that aren't provided by caregivers to children who stay at homes.

The instructive program on psychomotor development in institutionalized children

All institutionalized children in Vlora Foster Care during the study period were included in a monthly educational program of moderate stimulus from

a special educator. Despite the common goals for all children, the program was personalized and children were handled one-to-one and not as a group. Retesting made at the end of this development skills instructional program showed significant improvement in almost all domains (Table 3). The domain with the most significant improvement was the communications domain, where out of six children under the cut-off before the program, only one of them communicated below the minimum required after attending that program.

Table 3. The psychometric parameters pre- and post- instructive training

Psychomotor domains	Communication		Global motor		Fine motor		Problem solving		Personal-social sector	
	before	after	before	after	before	after	before	after	before	after
below cut-off	4	7	9	11	3	9	1	4	7	6
near cut-off	2	4	1	1	4	2	5	5	1	4
under cut-off	6	1	2	0	5	1	6	3	4	2

Although in the program were not included the global motor exercises, there was slight improvement even in this domain. This is a result that supports data studies by Baltes (24) or Rhemtulla (25) that attempted to prove that the degree of development of the child in one developing domain relates to the degree of development in other sectors.

Improving psychometric indicators of children by adequate environmental stimulation has been documented in many studies in this field, which proved that simple stimulation programs (musical, colorful toys) can produce spectacular results with low cost (26,27).

Conclusion

This study proved in many aspects that preschoolers' psychomotor development is largely determined by

incentives offered by institutional environment. A very high percentage of children (respectively 40.0% and 32.5%) are detected to have only one psychometric delay or being in monitoring area. Both of these aspects are not a consequence of the lack of internal potential of children (such as the ones in reference areas, or with multiple delays), but by inappropriate incentives during their instruction. In the studied population these high percentages of moderate atypical development were found associated with high percentages of inadequate environmental stimulation as well.

In conclusion, parents and caregivers must work constantly to create a stimulating environment for the child (verbal, music, reading books), and not only in preschool age when the child is prepared to enter in primary school.

Conflicts of interest: None declared.

References

- Gandini L. The story and foundations of the Reggio Emilia approach. Teaching and learning: Collaborative exploration of the Reggio Emilia approach. New Jersey; 2002:13-21.
- Effective Philanthropy. Factors affecting early childhood development. Available from: <http://www.effectivephilanthropy.com.au/images/docs/Key%20Factors%20Affecting%20Early%20Childhood%20Development.pdf> (Accessed: August 10, 2015).
- Sameroff AJ, Seifer R, Baldwin A, Baldwin C. Stability of intelligence from preschool to adolescence: The influence of social and family risk factors. *Child Dev* 1994;64:80-97.
- Eitel J. Factors affecting early child development. 2011. Available from: www.livestrong.com/article/217996/ (Accessed: August 10, 2015).
- Mackrides PS, Ryherd SJ. Screening for developmental delay. *Am Fam Physician* 2011;84:544-9.
- Clyman RB, Harden BJ, Little C. Assessment, intervention, and research with infants in out-of-home placement. *Infant Ment Health J* 2002;23:435-53.
- Chiu SH, DiMarko MA. A pilot study comparing two developmental screening tools for use with homeless children. *J Pediatr Health Care* 2010;24:73-80.
- Jee SH, Szilagyi M, Ovenshire C, Norton A, Conn AM, Blumkin A, et al. Improved detection of developmental delays among young children in foster care. *Pediatrics* 2010;125:282-9.
- Bruskas D. Developmental Health of Infants and Children Subsequent to Foster Care. *J Child Adolesc Psychiatr Nurs* 2010;23:231-41.
- Jee SH, Conn AM, Szilagyi PG, Blumkin A, Baldwin CD, Szilagyi MA. Identification of social-emotional problems among young children in foster care. *J Child Psychol Psychiatry* 2010;51:1351-8.
- Raman S, Reynolds S, Khan R. Addressing the well-being of Aboriginal children in out-of-home care: Are we there yet? *J Paediatr Child Health* 2011;47:806-11.
- Phillips DA, Shonkoff JP (Eds.). From Neurons to Neighborhoods: The Science of Early Childhood Development. National Academies Press, Washington, DC; 2000.
- Lozoff B, Klein NK, Nelson EC, McClish DK, Manuel M, Chacon ME. Behavior of Infants with Iron-Deficiency Anemia. *Child Dev* 1998;69:24-36.
- Burchinal M, Vandergrift N, Pianta R, Mashburn A. Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. *Early Child Res Q* 2010;25:166-76.
- Sylva K, Siraj-Blatchford I, Taggart B. Child and Adult Activities in High Quality Early Education: role of sustained shared thinking. Biennial Meeting EARLI SIG 5 'Researching Development, Learning and Well-Being in Early Childhood'. Utrecht University, the Netherlands; 2012.
- Watamura SE, Donzella B, Alwin J, Gunnar MR. Morning-to-afternoon increases in cortisol concentrations for infants and toddlers at child care: Age differences and behavioral correlates. *Child Dev* 2003;74:1006-20.
- Vandell DL, Belsky J, Burchinal M, Steinberg L, Vandergrift N. Do effects of early child care extend to age 15 years? Results from the NICHD study of early child care and youth development. *Child Dev* 2010;81:737-56.
- Broekhuizen M, van Aken M. Combined effects of early childcare and education and the home-environment on child socioemotional adjustment. Biennial Meeting EARLI SIG 5 'Researching Development, Learning and Well-Being in Early Childhood'. Utrecht University, the Netherlands; 2012.
- Currie J. Early Childhood Intervention Programs: What Do We Know? JCPR Working Paper; 2000.
- Meisels SJ, Shonkoff JP. Early childhood intervention: A continuing evolution. Handbook of early childhood intervention 2nd Edition. New York: Cambridge University Press; 2000:3-31.
- Helmerhorst K, Fukkink R. Measuring quality in early childhood education and care. Biennial Meeting EARLI SIG 5 'Researching Development, Learning and Well-Being in Early Childhood'. Utrecht University, the Netherlands; 2012.
- Freitas TC, Gabbard C, Caçola P, Montebelo MI, Santos DC. Family socioeconomic status and the provision of motor affordances in the home. *Braz J Phys Ther* 2013;17:319-27.
- NICHD Early Child Care Research Network. Contexts of development and developmental outcomes over the first seven years of life. The relation of child care to cognitive and language development. *Child Dev* 2000;71:958-78.
- Baltes PB, Nesselroade JR. History and rationale of longitudinal research. In Nesselroade JR, Baltes PB (eds.), Longitudinal research in the study of behavior and development. New York: Academic Press; 1979:1-39.
- Rhemtulla M, Tucker-Drob EM. Correlated longitudinal changes across linguistic, achievement, and psychomotor domains in early childhood: Evidence for a global dimension of development. *Dev Sci* 2001;14:1245-54.
- Avan BI, Raza SA, Kirkwood BR. A community-based study of early childhood sensory stimulation in home environment associated with growth and psychomotor development in Pakistan. *Int J Public Health* 2014;59:779-88.
- Clyman RB, Harden BJ, Little C. Assessment, intervention, and research with infants in out-of-home placement. *Infant Ment Health J* 2002;23:435-53.