

Effect of Maternal Deprivation and Family Surroundings on Institutionalized Preschool Children's Development

Dr.Medhat Hassan Shehata, Professor of Paediatrics Department of Medical Studies for children Institute of Post Graduate Childhood Studies

Dr.Samia Samy Aziz, Professor Of Public Health Department of Medical Studies for children Institute of Post Graduate Childhood Studies

Dr.Neveen Tawakol Younis, Professor Of Paediatrics Faculty Of Medicine

Hanan Abu El Nasr Zakaria Masoud

Abstract

Introduction: Institutionalized children experience ineffective nurturing social and environmental conditions resulting in maternal, sensory, cognitive, linguistic, and psychosocial deprivation.

Objective: Assessing the effect of maternal and family context deprivation on the development of preschool children living in orphanages.

Subjects and Methods: Fifty institutionalized children of both sexes with age ranged (3- 5) years underwent auxological assessment height (Ht), weight (Wt), head circumference (HC), and left mid upper arm circumference (MUAC) and Portage developmental assessment in comparison to 50 home living controls of the same age and sex.

Results: institutionalized children showed statistically significant lower Ht, Wt and HC Z- scores (median (IQR)-0.2 (- 0.89: 0.32), - 0.27 (- 0.87: 0.5), 0.4 1 (- 0.2: 1.47 respectively) and percentiles and lower developmental quotient (DQ) scores across all developmental (median (IQR) for Social DQs was 92.55 (87.97: 101.4), for language DQs 91.45 (87.5: 97.55), for self care DQs 89.75 (82.65: 98.4), for cognitive DQs 84.3 (78.1: 94.6) and for motor DQs 97.15 (94.67: 104.7) when compared to home living children's Ht, Wt and HC Z- scores (median (IQR) 0.51 (0.03: 1.1), 0.1 (- 0.28: 0.51), 1.63 (0.45: 2.23 respectively) and percentiles and DQ scores (median (IQR) for Social DQs was 108.2 (105.5: 114.6), for language DQs 103.9 (100: 108.4), for self care DQs 105 (100: 110.1), for cognitive DQs 104 (96.9: 108.2) and for motor DQs 110.6 (105.2: 115.3), meanwhile; they had statistically significant higher MUAC Z- scores (median (IQR) 0.39 (- 0.31: 1.19) and percentiles compared to home living children (median (IQR)-0.0 2 (- 1.2: 0.52).

Conclusion: Institutionalized maternally deprived children have delayed physical growth and development (social, language, self care, cognitive and motor).

Keywords: Maternal deprivation- Institutionalization- Institutions- Child development- Growth- social development- development language- development- self care, cognitive development- motor development.

تأثير الحرمان من الأم ومن المحيط الأسري على تطور أطفال مؤسسات الرعاية الخاصة في سن ما قبل المدرسة

المقدمة: الأطفال الذين تمت تنشئتهم في مؤسسات الرعاية يواجهون ظروف بيئية واجتماعية غير فعالة تؤدي الى الاحساس بالحرمان الأمومي والحسي والمعرفي واللغوي، والنفسي.

الهدف: تقييم تأثير الحرمان من الأمهات والمحيط الأسري على نمو وتطور أطفال مؤسسات الرعاية في سن ما قبل المدرسة.

العينة وطرق البحث: أجريت هذه الدراسة على ٥٠ طفل وطفلة من أطفال مؤسسات الرعاية الخاصة تتراوح أعمارهم بين (٣-٥) سنوات من كلا الجنسين ومقارنتهم بـ ٥٠ طفل اخر يعيشون مع ذويهم كعينة ضابطة وقد اخضعوا للتقييم الاثروبوميترى عن طريق قياس الطول، الوزن، محيط الرأس ومحيط منتصف أعلى الذراع وللتقييم النمائي باستخدام قائمة بورناتج لتطور الطفل.

النتائج: بعد مقارنة كلتا المجموعتين وجد أن الأطفال الأيتام حصلوا على قياسات أقل في الطول - ٠,٢ (- ٠,٨٩ : ٠,٣٢) والوزن - ٠,٢٧ (- ٠,٨٧ : ٠,٥) ومحيط الرأس ٠,٤١ (- ٠,٢ : ١,٤٧) وأعمار نمائية أقل في جميع المجالات النمائية (معامل النمو الاجتماعي ٩٢,٥٥ (٨٧,٩٧ : ١٠١,٤)، معامل النمو اللغوي ٩١,٤٥ (٨٧,٥ : ٩٧,٥)، معامل الرعاية الذاتية ٨٩,٧ (٨٢,٦٥ : ٩٨,٤)، معامل النمو الإدراكي ٨٤,٣ (٧٨,١ : ٩٤,٦)، ومعامل النمو الحركي ٩٧,١٥ (٩٤,٦٧ : ١٠٤,٧) عند مقارنتهم بأطفال ٠,٥١ (٠,٠٥ : ١,١) وأوزان ٠,١ (- ٠,٢٨ : ٠,٥١) ومحيط رأس ١,٦٣ (٠,٤٥ : ٢,٢٣) والأعمار النمائية؛ معامل النمو الاجتماعي ١٠٨,٢ (١٠٥,٥ : ١١٤,٦)، معامل النمو اللغوي ١٠٣,٩ (١٠٠ : ١٠٨,٤)، معامل الرعاية الذاتية ١٠٥ (١٠٠ : ١١٠,١)، معامل النمو الإدراكي ١٠٤ (٩٦,٩ : ١٠٨,٢) ومعامل النمو الحركي ١١٠,٦ (١٠٥,٢ : ١١٥,٣)؛ لأطفال العينة الضابطة. بينما كانت قياساتهم في محيط منتصف أعلى الذراع ٠,٣٩ (- ٠,٣١ : ١,١٩) أعلى من العينة الضابطة - ٠,٠٢ (- ١,٢ : ٠,٥٢).

الخلاصة: أطفال مؤسسات الرعاية الخاصة يتأخرون في النمو الجسماني والتطور (الاجتماعي، اللغوي، رعاية الذات، الإدراكي والحركي).

الكلمات الكاشفة: الحرمان من الامهات، مؤسسات الرعاية، نمو الطفل، تطور الطفل، النمو الاجتماعي، النمو اللغوي، الرعاية الذاتية، النمو الإدراكي، النمو الحركي.

Background:

Maternal deprivation (MD) is the lack of adequate physical care and of social and emotional stimulation and interchange (Molitor & Mayes, 2002). Early childhood MD, period from prenatal development to eight years of age, is a life stressor (Berman et al., 2014) which shapes behavioural and neurochemical phenotype, emotional and physiological responses (Kaffman & Meaney, 2007; Vetulani, 2013) that influence outcomes across the entire course of an individual's life (Irwin et al., 2007).

Orphans raised in institutional settings experience ineffective nurturing social and environmental conditions that result in profound sensory, cognitive, linguistic, and psychosocial deprivation (Nelson, 2007) as well as lack of opportunities for attachment (Feigelman, 2011) leading to deficiency of the interacting sensory, social and hormonal experiences coming from the mother (Melo, 2015), and of expected stimulating home environments and interpersonal relationships inputs (McLaughlin et al., 2010; Fernald et al., 2009; Walker et al., 2007). The effects of early deprivation include factors such as: inadequate sanitation, nutrition and medical care, lack of individualized, consistent and supportive caregiver relationships (Pollak et al., 2010), little linguistic stimulation (Nelson, 2007) social, emotional and cognitive impoverishment (Bick et al., 2015) and exposure to different types of child abuse including physical, sexual (Lueger, Schuster et al., 2014) and emotional and neglect (UNICEF, 2014). In addition, regimented daily schedules (Zeanah et al., 2009), large groups of children, high children: caregiver ratios, many and changing caregivers, children's frequent changes of institution (Muhamedrahimov et al., 2004; McCall 2013; Wright et al., 2014) and caregiver- child interactions that lack warm, sensitive, responsive, and child- directed behaviours (McCall, 2013) add more to the instability and inconsistency of the children's environment in institutional care (Muhamedrahimov et al., 2004; Wright et al., 2014).

Impact of Institutionalization on Children growth:

Institutionalized Children develop global growth retardation with persistent abnormalities in the hypothalamic- pituitary- adrenal system (Johnson & Gunnar, 2011; Parks & Felner, 2011). They show delayed physical growth: height, weight, and head circumference (Johnson et al., 2010) to the extent that they lose about 1 month of linear growth for every (2- 3) months in institutional care (Johnson, 2001) leading eventually to stunted growth (Rutter, 1998) and decreased head circumference (Nelson et al., 2011). This delay could be attributed to many interfering factors such as: Nutritional deficiencies; Quantity, quality, Digestibility, and Palatability of food, Improper feeding techniques, Micronutrient deficiencies and Poor appetite beside Medical problems; Dental disease, infections, Parasitic infestation, Malabsorption and others; timing and duration of orphanage confinement, growth status at entry, chronic stress and depression, caregivers consistency and nurturing qualities (Nelson et al., 2011; Miller, 2012).

Impact of Institutionalization on Children development:

Cognitively, severe deprivation is associated with neurocognitive delay or impairment (Bick & Nelson, 2016) with presence of nervous system development maturational lag or cortical hypoactivation (McLaughlin et al., 2010; Marshall et al., 2004) and Institutionalized children develop Impaired intellectual abilities, visual- spatial, learning/ memory, and attention/executive functions with worse academic performance and need for individualized education programs (DeBellis et al., 2009; Loman et al., 2009; Cohen et al., 2008; Colvert et al., 2008; Nelson et al., 2007). Linguistically, institutionalized Children show language delays and deficits, with inability to produce complex sentences (Windsor et al., 2007; Windsor, 2013), poor sentence comprehension abilities, difficulty with school- related language (Desmarais et al., 2012) and academic learning problems (van Ijzendoorn et al., 2005). Socially, they develop wide range of social problems including: speech reticence, low social engagement (Almas et al., 2015), few friends with poor friendship relations (Erol et al., 2010), difficulty in initiating contact with new peers, in solving disputes, in managing peer pressure, in emotions regulation, in using time wisely and in attending to teachers requests (Almas et al., 2012). Social rejection or exclusion with the resultant involvement in delinquent or risk- taking behaviours (Ollendick et al., 1992; Almas et al., 2015) and rule- breaking behavioral problems (Muhamedrahimov et al., 2014) are also found in institutionalized children. Motorically, Institutionalization does not afford adequate experiences of movement and exploration and other opportunities needed for the development of age- level motor activity and skills (Roeber et al., 2012) resulting in significant both gross and fine motor developmental delay (Rettig & McCarthy- Rettig, 2006) and delay in balance and bilateral coordination (Roeber et al., 2012).

Hypothesis and aim of the study:

Based on the hypothesis that maternal and family surroundings deprivation negatively impact child development causing developmental delay, children institutionalization as a cause of maternal, social and environmental deprivation will cause developmental delay. So, the study aims at assessing and early detecting the effect of maternal and family context deprivation on the development of preschool children living in orphanages.

Subjects & Methods**Study Design:**

Case Control Comparative Study.

Subjects:

Subjects in the study were 100 children, with age range from (3- 5) years from both genders. They were divided into 2 groups: case group included 50 true orphans, 23 boys and 27 girls, who do not have any living parents and living in institutional care centers since birth and control group included 50 mothered home- living children, 25 boys and 25 girls, living with their families in normal home atmosphere. Children excluded from the study were those with any chronic medical health condition known through medical history taking or physical examination and could

affect their growth and development, or those who were going to kindergarten.

Methods:

After obtaining the required approvals from Egyptian Ministry of Social Affairs, and responsible persons in orphanages and nurseries included in the study, Institutionalized children were recruited from 17 Districts of Cairo Governorate to represent the main 4 sectors of Egypt; East, West, North and South over a period of 19 months starting from 1st of August 2014 to end of February 2016, while matching control children were collected from day care nurseries.

All children were assessed auxologically by measuring height, weight, head circumference and mid upper arm circumference and developmentally by Portage developmental checklist. For each child 3 interviews were required to complete the assessment.

History Taking And Physical Examination:

History taking included the following: Personal data and Health and development information history including pregnancy and birth history, dietitic history, family history, current and past medical information history, psychiatric history, developmental history. For institutionalized children most of personal data and some points in the history couldn't be obtained or were missed. General examination and local systematic examination especially neurological examination were done to exclude any systemic disease that would affect development.

Physical Growth Measure

Auxological measurements were done following the standardized measurement protocols. Standing height (Ht) and weight (Wt) with the calculated Body Mass Index (BMI), head circumference (HC) and left mid upper arm circumference (MUAC) measurements were obtained by calculating an average of triplicate measurements. Age and gender specific Z- scores (standard deviation SD) and percentiles for HtA, WtA, WtHtA, BMIA, OFCA, MUACA indicators were calculated based on the WHO

growth charts using WHO Anthro Software version 3.2.2 (WHO 2011).

Developmental Assessment:

Portage developmental checklist was administered to assess the developmental status. It is a behavioral checklist contains 580 developmentally sequenced behaviors individually administered to assess the child's progress in the main five developmental areas: socialization, language, self help, cognition, and motor skills. After administration of assessment, a domain specific developmental age was calculated and then converted to a developmental quotient (DQ) for each domain.

Statistical Analysis:

Statistical analysis was performed using SPSS software for Windows version 22.0. Most of collected data were non parametric and comparison of auxology and developmental assessment data between cases and controls was done using Mann Whitney Test with p values of ≤0.05 were considered to be significant.

Results:

Physical growth parameters of both cases and control groups were descriptively represented in the form of mean (SD), and median (IQR) then compared to each other to detect the effect of institutionalization on growth status of orphans Table (1) and a statistically significant lower scores of Ht, Wt and HC percentiles and Z- scores of institutionalized children were found compared to home living children meaning that they were shorter, thinner children with smaller head size than their controls, at the same time institutionalized children had higher MUAC Z- scores and percentiles values than home living children meaning that they were nutritionally better than their controls.

We also compared developmental status of institutionalized and home living children Table (2) and found that institutionalized children had statistically significant lower DQ scores across all developmental domains when compared to control group children with the least DQ score is found in cognitive domain.

Table (1) Descriptive statistics, and comparison between study groups regarding physical growth parameters

Growth Parameters Z- Score	Group				(Z)	P- Value
	Institution living cases (N= 50)		Home living Controls (N= 50)			
	Mean± SD	Median (IQR)	Mean± SD	Median (IQR)		
Hta Z- Score And Percentile	- 0.2± 1.05	- 0.2 (- 0.89:0.32)	0.41± 0.93	0.51 (0.03: 1.1)	3.657	0.000**
	43.31± 29.03	42.15 (18.47: 62.67)	63.4± 27.56	69.4 (48.8: 86.27)	(3.413)	0.001**
Wta Z- Score And Percentile	- 0.3± 1.09	- 0.27 (- 0.87: 0.5)	0.01± 0.8	0.1 (- 0.28:0.51)	2.027	0.04
	41.96± 27.75	39.25 (19.3: 68.5)	51.7± 23.78	53.85 (39.25: 69.5)	(2.037)	(0.04)
WtHt Z- Score And Percentile	- 0.35± 1.36	- 0.35 (- 1: 0.39)	- 0.4± 1.04	- 0.35 (- 0.97: 0.12)	0.255	0.79
	41.79± 30.99	36.5 (15.87: 65.15)	38.37± 26.3	36.4 (16.65: 54.9)	(0.286)	0.77
Bmia Z- Score And Percentile	- 0.25± 1.35	- 0.29 (- 0.85: 0.55)	- 0.23± 1.11	- 0.36 (- 1.04: 0.24)	0.589	0.55
	43.19± 30.15	37.85 (18.45: 66)	39± 26.7	35.15 (14.67: 57.5)	(0.641)	0.52
Hca Z- Score And Percentile	0.6± 1.04	0.41 (- 0.2: 1.47)	1.34± 1.1	1.63 (0.45: 2.23)	3.423	0.001**
	65.5± 25.9	65.65 (42: 92.95)	80.8± 24.4	94.85 (67.37: 98.7)	(3.375)	0.001**
Muaca Z- Score And Percentile	0.39± 1.02	0.39 (- 0.31: 1.19)	- 0.26± 1.09	- 0.02 (- 1.2:0.52)	2.817	0.005
	62.13± 28.89	65 (37.77: 88.35)	43.6± 31.6	44.9 (8.65: 69.8)	(2.965)	0.003

(Z)= Mann Whitney Test, HtA= Height for age, WtA= Weight for Age, WtHt= Weight for Height, BMIA= Body Mass Index for age, HcA= Head Circumference for age, MUACA= Left mid Upper arm circumference for age, * = Significant, ** = Highly significant.

Table (2) Descriptive statistics, and comparison between study groups regarding Portage assessment developmental quotients

Developmental Quotient (Dq)	Group				(Z)	P- Value
	Institution Living (Cases)		Home Living (Controls)			
	Mean± SD	Median (IQR)	Mean± SD	Median (IQR)		
Social DQ	95.2	92.55	110.2	108.2	6.188	0.001**
	± 10.8	(87.97- 101.4)	± 7.6	(105.5- 114.6)		
Language DQ	92.02	91.45	105.0	103.9	6.189	0.001**
	± 8.98	(87.5- 97.55)	± 9.4	(100- 108.4)		
Self Care Dq	90.39	89.75	105.7	105	6.45	0.001**
	± 10.37	(82.65- 98.4)	± 8.5	(100- 110.1)		
Cognitive DQ	85.95	84.3	104.5	104	6.512	0.001**
	± 11.68	(78.1- 94.6)	± 11.6	(96.9- 108.2)		
Motor DQ	99.75	± 6.89	110.3	110.6	6.274	0.001**
	97.15	(94.67- 104.7)	± 6.4	(105.2- 115.3)		

(Z)= Mann Whitney Test, DQ Developmental Quotient,**= Highly significant.

Discussion:

This study was carried out to assess the effect of institutionalization as an etiological factor of early maternal, social and environmental deprivation on children's growth and development.

As was predicted, significant delay in height, weight and head circumference measurements and global developmental delay was observed. These findings corresponded to Smyke et.al. (2007) ones in which they found Romanian institutionalized 123 children (56 institutionalized since birth, all children had median percentage of life institutionalization of 98.16) in Bucharest institutions to have physical growth parameters Z-score for Ht -0.89 (0.90), for Wt -1.25 (1.07), for WtHt -0.79 (1.03) and for HC -0.77 (0.97) while their controls' Z scores were for Ht 0.06 (0.98), for Wt -0.06 (1.02), for WtHt 0.002 (0.99) and for HC 0.17 (0.79) and to Cohen et.al. (2008) who studied Chinese infants adopted to Canada and found that those adoptees had smaller physical development indices including Ht; within the 50th percentile, Wt; within the 10th percentile, HC; within the 50th percentile, HtA ratio, and WtHt ratio compared to their peers. Moreover, Hearst et.al. (2014) who found that mean Z-scores for length- /height, Wt, and weight- for- length-/ height in institutionalized children were all negative (-1.5 (1.9), -0.7 (1.5) and -1.3 (1.5) respectively) with with Z-scores ≤ -2 in 37% of children for length/ height; 31.5% for weight and 22.1% for Weight- for- length/ height and Kroupina and his colleagues (2015) demonstrated that institutionalized children had Z scores for length/ height, Wt, Weight- for- length/ height and HC respectively -1.62 (1.61), -1.34 (1.17), -0.63 (1.41) and -1.70 (1.27) with Z-scores ≤ -2 in 36% of children for length/ height; 22% for weight, 19% for weight- for- length / height and 41% for HC.

In addition, in a study conducted by Saboula et.al. (2015), 57.6% of Egyptian children living in Menoufia Governorate orphanages were found to be underweight and 2.4% was obese, while, 33.6% had normal weight.

On contrary, Whetten et.al. (2014) found after 36- month follow- up that institution- living children had statistically significant higher height Z-scores (-1.4 ± 1.3) than their control family- living fostered children (-1.6 ± 1.3) with $P = 0.002$. Most probably, that contradiction was attributable to: the large sample size Whetten and his colleagues worked on; 1357 institution- living children and 1480 family- living, or due to the older age

they selected for the their study; age ranged from 6 to 12 and after 3 years follow up ranged from 8 to 16 years that gave children the opportunity to catch up the growth, or due to improved quality of institutional care in the studied countries more than home based care due to financial and social issues found in such low and middle income countries (Cambodia, Ethiopia, Kenya, India and Tanzania) where the study was performed.

Regarding children's developmental level in the current study, comparing institutionalized children to family- reared children revealed that institutionalized children showed delay in all five developmental domains; social, language, self care, cognitive and motor

This came in agreement with developmental levels of adopted Chinese children who were assessed developmentally by Miller& Hendrie (2000) who used the Peabody Developmental Motor Scale and the University of Michigan Early Intervention Development Profile, and revealed that 75% of those children had significant developmental delay in at least 1 domain: gross motor in 55%, fine motor in 49%, cognitive in 32%, language in 43%, social- emotional in 28%, activities of daily living in 30%, and global delays in 44%, and Cohen et.al. (2008) who found those children exhibiting developmental delays; denoted by lower scores on Mental Development Index (MDI score= 76.84, control score= 102.74) and Psychomotor Development Index (PDI score= 73.4, control score= 96.19) of the Bayley Scales of Infant Development- II at initial assessment and on Preschool Language Scale- 3 at 6 months post adoption (receptive language score= 100.67, control score= 112.27, expressive language score= 93.87, control score= 107.63) when compared to current peers. Moreover, in Rettig& McCarthy- Rettig (2006) survey study of health, and development of 240 Chinese adoptees, 62% of children had developmental delay, of this number, 91% had motor development delays at the time of adoption.

Added to the above, McCall et.al. (2010) who worked on Latin America orphanages' children using Battelle Developmental Inventory (BDI) to measure adaptive, personal- social, communication, motor, cognitive DQs and found that younger children had total DQ= 67.95 (8.62) and older children total DQ= 59.94 (7.38), with 82.0% of children had $DQ < 70$, 13.1% $DQ = 70- 79$, 4.9% $DQ = 80- 89.0$ $DQ \geq 90$ DQ.

In Greece, Giagazoglou and his colleagues (2012) examined the

differences in the psychomotor developmental profiles of 96 preschool (4-6) years aged Greek children living in conventional institutions (N= 28), in SOS villages (N= 20) and in natural family environment (N= 48) using Griffiths Scale No II, and found that family reared children had better performance in all scales of the Griffiths test compared with children of the other two groups (family reared children General DQ= 113.44± 13.03, conventional institutions children General DQ= 75.96± 12.31, SOS villages children General DQ= 95.30± 9.01 with P=< 0.01 in between), while in United States Welsh & Viana (2012) followed up post institutionalized internationally adopted children from China, Korea, Latin America, Eastern Europe, and other Asian countries; over a period of 18 months using Ages and Stages Questionnaire (ASQ) to assess them developmentally. Although they didn't apply the ASQ immediately after arrival to United States, the 6 month post adoption assessment revealed developmental delay; score for communication 36.09± 15.81, for fine-motor score 43.80± 13.09, for gross-motor 46.85± 15.89, for personal-social 42.93± 12.32 and for problem-solving 42.22± 15.76 out of 60 for each domain. Further, In Kazakhstan Kroupina et.al. (2015) indicated that institution living children were developmentally compromised, denoting that by lower scores in BSID- II MDI 75.74± 18.75, PDI 77.93± 20.78 with 40% of children scoring within the normal range on the MDI, 19% scored in the mild delay range and 41% with significant delay and 41% showed normal PDI, 22% with mild delay range and 37% with significantly delayed and in Egypt, Fawzy & Fouad (2010) studied orphans aging (6- 12) years in Sharkia governorate using Pediatric Symptom Checklist (PSC) to recognize cognitive, emotional, and behavioral problems as a reflection of their developmental status and/or developmental disorders and found that 61% of children had Developmental disorder, of them 82% were females.

Cognitive development in institutionalized children was spotted through many studies for example; Mbiya Muadi et.al. (2014) evaluated of the quality of attachment effect on the cognitive development of 42 abandoned children placed in institutions in Kinshasa, Democratic Republic of Congo using Raven's colored progressive matrices Test in assessing nonverbal reasoning abilities, and demonstrated that the mean values of cognitive performance obtained from 42 control children (19.3± 4.7) were higher than those obtained from children in institutions (13.3± 4.7) with P= <0.001. Further, reviews done by Berens & Nelson (2015) and Juffer and his colleagues (2015) proved the presence of cognitive delay in institutionalized children. Berens & Nelson in their review documented a meta-analytic study assessed the effects of institutionalisation on IQ/ DQ for infants in data from 42 studies of more than 3888 children in 19 countries in which institutional care, when compared with family-based care, had a significant combined effect size on IQ/DQ of d= 1.10 (95% CI 0.84- 1.36, p<0.01), while Juffer et.al. (2015) work on 7 studies conducted on Chinese children adopted to USA, Canada, and the Netherlands at arrival in the adoptive family and confirmed the delay in both cognitive and motor development.

Motor development also, examined in Ethiopian/Eritean children Post institutionalization by Miller and his colleagues (2008) and were found to have gross/fine motor and cognitive skills of approximately 86% of the expected for age. In addition, Levin et.al. (2014) in their work on institutionalized Romanian children aging 8 years to assess their motor proficiency level by applying Bruininks- Oseretsky Test of Motor Proficiency, Second Edition, Short Form (BOT2- SF), found that community children performed significantly better on the BOT2- SF than institutionalized children (p < 0.01) with average score equivalent to a 6.5 year old child while community children's score were equivalent to an 8 year old child.

Like cognitive and motor development, institutionalized children were studied socially wise by Johnson et.al. (2006) who reviewed studies performed on institutional care for young children across Europe in the period 1996 to 2003 and found 17 ones studied social and behavioural development and 12 ones addressing cognitive development, which proved presence of developmental delays in social, behavioral, cognitive and language domains and by Almas et.al. (2012) who found that community Romanian children were rated significantly higher than institutionalized children by teachers on Social Skills Rating System (P< 0.01) which assessed children's social skills, problem behaviors, and academic competence.

References:

1. Almas A. N., Degnan K. A., Radulescu A., Nelson C. A. III, Zeanah C. H., and Fox N. A. (2012): **Effects of early intervention and the moderating effects of brain activity on institutionalized children's social skills at age 8.** Proc Natl. Acad. Sci. USA; 109 (2): 17228-17231.
2. Almas A. N., Degnan K.A., Walker O.L., Radulescu A., Nelson C. A., Zeanah C. H. and Fox N. A. (2015): The Effects of Early Institutionalization and Foster Care Intervention on Children's Social Behaviors at Age 8. **Soc Dev**; 24 (2):2 25- 239.
3. Berens A. E. and Nelson C.A. (2015): The science of early adversity: is there a role for large institutions in the care of vulnerable children?. **Lancet**; 386 (9991):3 88- 98.
4. Berman A.K., Lott R.B. and Donaldson S.T. (2014): Periodic maternal deprivation may modulate offspring anxiety like behavior through mechanisms involving neuroplasticity in the amygdala. **Brain Res Bull**; 101:7- 11.
5. Bick J. and Nelson C. A. (2016): Early Adverse Experiences and the Developing Brain. **Neuropsychopharmacology**; 41 (1):1 77- 96.
6. Bick J., Zhu T., Stamoulis C., Fox N.A., Zeanah C. and Nelson C.A. (2015): A Randomized Clinical Trial of Foster Care as an Intervention for Early Institutionalization: Long Term Improvements in White Matter Microstructure. **JAMA Pediatr**; 169 (3): 211- 219.
7. Cohen N.J., Lojkasek M., Zadeh Z.Y., Pugliese M. and Kiefer H. (2008): Children adopted from China: a prospective study of their growth and development. **Journal of Child Psychology and**

- Psychiatry**; 49: 458- 468.
8. Colvert E., Rutter M., Kreppner J., Beckett C., Castle J., Groothues C., Hawkins A., Stevens S. and Sonuga-Barke E. J. (2008): Do theory of mind and executive function deficits underlie the adverse outcomes associated with profound early deprivation?: findings from the English and Romanian adoptees study. **J Abnorm Child Psychol**; 36 (7):1 057- 1068.
 9. De Bellis M. D., Hooper S. R., Spratt E. G. and Woolley D. P. (2009): Neuropsychological findings in childhood neglect and their relationships to pediatric PTSD. **J Int Neuropsychol Soc**; 15: 868- 878.
 10. Desmarais C., Roeber B.J., Smith M.E., and Pollak S.D. (2011): Sentence comprehension in post- institutionalized school- aged children. **J Speech Lang Hear Res**; 55 (1): 45- 54.
 11. Erol N., Simsek Z. and Münir K. (2010): Mental health of adolescents reared in institutional care in Turkey: Challenges and hope in the twenty- first century. **Eur. Child Adolesc Psychiatry** 19:113- 124.
 12. Fawzy N. and Fouad A. (2010): Psychosocial and Developmental Status of Orphanage Children: Epidemiological Study. **Current Psychiatry**; 17 (2): 41- 48.
 13. Feigelman S. (2011). Overview and Assessment of Variability. In: Kliegman R. M., Stanton B. F., Geme J. W. St. III, Schor N. F. and Behrman R. E. (Eds.), *Nelson Textbook of Pediatrics* (19th ed.), Part II: **Growth, Development, and Behavior**. Philadelphia, USA: Elsevier Inc.
 14. Fernald L. C. H., Kariger P., Engle P. and Raikes A. (2009). **Examining early child development in low- income countries: a toolkit for the assessment of children in the first five years of life**. Washington: World Bank.
 15. Giagazoglou P., Kouliouisi C., Sidiropoulou M. And Fahantidou A. (2012): The effect of institutionalization on psychomotor development of preschool aged children. **Research in Developmental Disabilities**; 33 (3):9 64- 970.
 16. Hearst M. O., Himes J. H; Spoon Foundation., Johnson DE., Kroupina M., Syzdykova A., Aidjanov M. and Sharmonov T. (2014): Growth, nutritional, and developmental status of young children living in orphanages in Kazakhstan. **Infant Ment Health J**; 35 (2):9 4- 101.
 17. **IBM SPSS Statistics for Windows**, Version 22.0. (2013). Armonk, NY: IBM Corp.
 18. Irwin L. G., Siddiqi A. And Hertzman C. (2007). Early childhood development: a powerful equalizer- final report of the Early Child Development Knowledge Network (ECDKN). Jones E. (1913/ 1923). *Hate and anal erotism in the obsessional neurotic*. In *Papers on Psychoanalysis*. London: Baillire.
 19. Johnson D. E. and Gunnar M. R. (2011): IV. Growth failure in institutionalized children: Monographs of the Society for Research in **Child Development**; 76 (4): 92- 126.
 20. Johnson D. E. (2001). The impact of orphanage rearing on growth and development. In Nelson C. A. (Ed.), *The effects of adversity on neurobehavioral development: Minnesota symposia on child psychology* (Vol. 31, pp. 113- 162). Mahwah, NJ: Erlbaum.
 21. Johnson D. E., Guthrie D., Smyke A. T., Koga S. F., Fox N. A., Zeanah C. H. and Nelson C. A. 3rd (2010): Growth and associations between auxology, caregiving environment, and cognition in socially deprived Romanian children randomized to foster vs ongoing institutional care. **Arch Pediatr Adolesc Med**; 164 (6):5 07- 16.
 22. Johnson R., Browne K. and Hamilton- Giachritsis C. (2006): Young children in institutional care at risk of harm. *Trauma Violence Abuse*; 7 (1):3 4- 60.
 23. Juffer F., Finet C., Vermeer H. and Van den Dries L. (2015): Attachment and Cognitive and Motor Development in the First Years after Adoption: A Review of Studies on Internationally Adopted Children from China. **Prax Kinderpsychol Kinderpsychiatr**; 64 (10):7 74- 92.
 24. Kaffman A. and Meaney M. (2007): Neurodevelopmental sequelae of postnatal maternal care in rodents: clinical and research implications of molecular insights. **J Child Psychol Psychiatry**; 48: 224- 244.
 25. Kroupina M. G., Toemen L., Aidjanov M. M., Georgieff M., Hearst M. O., Himes J. H. et.al., (2015): Predictors of developmental status in young children living in institutional care in Kazakhstan. **Matern Child Health J**; 19 (6):1 408- 16.
 26. Kroupina M. G., Eckerle J.K., Fuglestad A.J., Toemen L., Moberg S., Himes J.H., Miller B. S., et.al. (2015): Associations between physical growth and general cognitive functioning in international adoptees from Eastern Europe at 30 months post- arrival. **Journal of Neurodevelopmental Disorders** (2015) 7:36.
 27. Levin A. R., Zeanah CH. Jr., Fox N. A. and Nelson C. A. (2014): Motor outcomes in children exposed to early psychosocial deprivation. **J Pediatr**; 164 (1):1 23- 129.
 28. Loman M. M., Wiik K. L., Frenn K. A., Pollak S. D. and Gunnar M. R. (2009): Postinstitutionalized children's development: Growth, cognitive, and language outcomes. **J Dev Behav Pediatr**; 30:426- 434.
 29. Lueger- Schuster B., Kantor V., Weindl D., Knefel M., Moy Y., Butollo A., Jagsch R. and Glück T. (2014): Institutional abuse of children in the Austrian Catholic Church: types of abuse and impact on adult survivors' current mental health. **Child Abuse Negl**; 38 (1):52- 64.
 30. Marshall P. J., Fox N. A. and BEIP Core Group (2004): A Comparison of the Electroencephalogram between Institutionalized and Community Children in Romania. **Journal of cognitive Neuroscience**; 16 (8): 1327- 1338.
 31. Mbiya Muadi F., Mampunza S., Symann S., Habimana L., D'Hoore W., Malengreau M., Hermans D., Aujoulat I. and Charlier- Mikolajczak D. (2014): Attachment and child development in a residential institution in Kinshasa. **Arch Pediatr**; 21 (11):1 159- 66.
 32. McCall R. B. (2013): The consequences of early institutionalization:

- can institutions be improved?- should they? **Child and Adolescent Mental Health Journal**; 18 (4): 193- 201.
33. McCall R. B., Groark C. J., Fish L., Harkins D., Serrano G. and Gordon K. (2010): A socioemotional intervention in a Latin American orphanage. **Infant Mental Health Journal**; 31 (5): 521- 542.
 34. McLaughlin K. A., Fox N. A., Zeanah C. H., Sheridan M. A., Marshall P., and Nelson C. A. (2010): Delayed Maturation in Brain Electrical Activity Partially Explains the Association Between Early Environmental Deprivation and Symptoms of Attention- Deficit/ Hyperactivity Disorder. **Biol Psychiatry**; 68 (4): 329- 336.
 35. Melo A. I. (2015): Role of sensory, social, and hormonal signals from the mother on the development of offspring. **Adv. Neurobiol**; 10:219- 48.
 36. Miller L. C. (2012). **The Growth of Children in Institutions. In Preedy V. R. (Ed.), Handbook of Growth and Growth Monitoring in Health and Disease**, Springer Science+Business Media. Available from www.springer.com
 37. Miller L. C. and Hendrie N.W. (2000): Health of children adopted from China. **Pediatrics**; 105 (6):E 76.
 38. Miller L. C., Tseng B., Tirella L. G., Chan W. and Feig E. (2008): Health of children adopted from Ethiopia. **Matern Child Health J**; 12 (5):5 99- 605.
 39. Molitor A. and Mayes L. C. (2002). Separation and deprivation. In Lewis M. (Ed.), **Child and Adolescent Psychiatry: A Comprehensive Textbook** (3rd ed.) . Baltimore: Lippincott Williams& Wilkins.
 40. Muhamedrahimov R. J., Palmov O. I., Nikiforova N. V., Groark C. J. and McCall R. B. (2004): Institution- based early intervention program. **Infant Mental Health Journal**; 25 (5): 488- 501.
 41. Muhamedrahimov R. J., Agarkova V. V., Vershina E. A., Palmov O. I., Nikiforova N. V., McCall R. B. and Groark C. J. (2014): Behavior problems in children transferred from a socioemotionally depriving institution to St. Petersburg (Russian Federation) families. **Infant Ment Health J**; 35 (2): 111- 122.
 42. Nelson C. A. (2007): A neurobiological perspective on early human deprivation. **Child Development Perspectives**; 1: 13- 18.
 43. Nelson C. A. (2007): A neurobiological perspective on early human deprivation. **Child Development Perspectives**; 1: 13- 18.
 44. Nelson C. A., Bos K., Gunnar M. R., and Sonuga- Barke E. J. S. (2011): The Neurobiological Toll of Early Human Deprivation. **Monogr Soc. Res. Child Dev**; 76 (4):1 27- 146.
 45. Ollendick T. H., Weist M. D., Borden M. C., Greene R. W. (1992): Sociometric status and academic, behavioral, and psychological adjustment: A five- year longitudinal study. **Journal of Consulting and Clinical Psychology**; 60 (1): 80- 87.
 46. Parks J. S. and Felner E. I. (2011). Hypopituitarism. In Kliegman R. M., Stanton B. F., Geme III J. W. St., Schor N. F. and Behrman R. E. (Eds), **Nelson textbook of paediatrics** (19th ed.) . Philadelphia, USA: Elsevier.
 47. Pollak S. D., Schlaak M. F., Roeber B. J., Nelson Ch. A., Wewerka S. S., Wiik K. L., Frenn K. A., Loman M. M. and Gunnar M. R. (2010): Neuro developmental Effects of Early Deprivation in **Postinstitutionalized Children. Child Development**; 81 (1):2 24- 236.
 48. Rettig M. A. and McCarthy- Rettig K. (2006): A survey of the health, sleep, and development of children adopted from China. **Health Soc Work**; 31 (3):2 01- 7.
 49. Roeber B. J., Tober C. L., Bolt D. M. and Pollak S. D. (2012): Gross motor development in children adopted from orphanage settings. **Dev Med Child Neurol**; b54: 527- 31.
 50. Saboula N. E., Hussien A.A. and El- Refaee E. M. (2015): Occurrence and Consequences of Violence among Orphaned Institutionalized Children in Menoufia Governorate. **IOSR Journal of Nursing and Health Science**; 4 (3):2 6- 38
 51. Smyke A. T., Koga S. F., Johnson D. E., Fox N. A., Marshall P. J., Nelson C. A., Zeanah C. H. and BEIP Core Group (2007): The caregiving context in institution- reared and family- reared infants and toddlers in Romania. **J Child Psychol Psychiatry**; 48 (2):2 10- 8.
 52. United Nations Children's Fund (2014). **Hidden in Plain Sight: A statistical analysis of violence against children**, UNICEF, New York.
 53. Van Ijzendoorn M. H., Juffer F. and Poelhuis C. W. (2005): Adoption and cognitive development: a meta- analytic comparison of adopted and nonadopted children's IQ and school performance. **Psychol Bull**; 131 (2):3 01- 16.
 54. Vetulani J. (2013):E arly maternal separation: a rodent model of depression and a prevailing human condition. **Pharmacol Rep**; 65 (6):1 451- 61.
 55. Walker S. P. et.al. (2007): Child development: risk factors for adverse outcomes in developing countries. **Lancet**; 369:145- 147.
 56. Welsh J. A. and Viana A. G. (2012): Developmental Outcomes of Internationally Adopted Children. **Adoption Quarterly**; 15 (4):2 41- 264.
 57. Whetten K., Ostermann J., Pence B. W., Whetten R. A., Messer L. C. et.al., (2014): Three- Year Change in the Wellbeing of Orphaned and Separated Children in Institutional and Family- Based Care Settings in Five Low- and Middle- Income Countries. **Plos One**; 9 (8): e104872.
 58. Whetten K., Ostermann J., Pence B. W., Whetten R. A., Messer L. C. et.al., (2014): Three- Year Change in the Wellbeing of Orphaned and Separated Children in Institutional and Family- Based Care Settings in Five Low- and Middle- Income Countries. **Plos One**; 9 (8): e104872.
 59. WHO Anthro for personal computers, version 3.2.2, 2011: Software for assessing growth and development of the world's children. Geneva: WHO. Downloaded in February 2016 from: <http://www.who.int/childgrowth/software/en/>
 60. Windsor J., Glaze L. E., Koga S. F; Bucharest Early Intervention Project Core Group (2007): Language acquisition with limited input: Romanian institution and foster care. **J Speech Lang Hear Res**; 50

(5):1 365- 81.

61. Windsor J., Moraru A., Nelson C. A. 3rd, Fox N. A., and Zeanah C. H. (2013): Effect of Foster Care on Language Learning at 8 Years: Findings from the Bucharest Early Intervention Project. **J Child Lang**; 40 (3): 605- 627.
62. Wright A. C., Lamsal D., Ksetree M., Sharma A. and Jaffe K. (2014). From maid to mother: transforming facilities, staff training, and caregiver dignity in an institutional facility for young children in Nepal. **Infant Mental Health Journal**; 35 (2): 132- 143.
63. Zeanah C.H., Egger H.L., Smyke A.T., Nelson C.A., Fox N.A., Marshall P.J. and Guthrie D. (2009): Institutional rearing and psychiatric disorders in Romanian preschool children. **Am J Psychiatry**; 166(7): 777-85.