

Impact of institutionalization on IQ in adolescents of North-West India.

Ginjinder Kaur

**Department of Human Biology
Punjabi University, Patiala.**

Corresponding author: Dr. Ginjinder Kaur,
Department of Human Biology
Punjabi University, Patiala, Punjab, India.
e-mail : ginjinder_lamba@rediffmail.com

Abstract

This paper considers research into the use of institutional care in terms of cognitive development for the very young children in the states of North-West India. Cross – sectional data on 504 institutionalized and 570 controls (including both the sexes) aged 11 to 17 years were collected. In the present study, an attempt has been made to assess IQ and study the effect of institutionalization on variations in IQ with age in institutionalized and control adolescents of Punjab, Haryana and Chandigarh. Intelligence was assessed by Raven's Standard Progressive Matrices and the subjects were further classified into 7 categories of IQ based on classification given by Wechsler. More than half of the adolescents residing in orphanages were significantly below the average intelligence levels (IQ below 70). Institutionalization was responsible for lag in cognitive development of institutionalized adolescents.

Keywords: *Institutionalization, IQ, adolescents, controls,*

Introduction

Twenty one years ago, at the same time as the inception of United Nations Convention on the Rights of the child, many were shocked at the pictures of the sufferings of babies and young children in the orphanages of the newly independent state of Romania. Child psychiatrists and psychologists have focused much of their attention on early childhood with a stress on the consequences of maternal deprivation and other kinds of restriction or neglect in infancy (Spitz, 1945; Bowlby, 1951; Goldfarb,

1955; Casler, 1961 and Ainsworth, 1964). Among these consequences are sometimes low IQs. Earlier reports of malnourished infants and children reported markedly reduced developmental quotients (DQs) or intelligence quotients (IQs) on standardized tests (Gerber & Dean, 1956; Barrera-Moncada, 1963 and Cabak and Najdanvik, 1965).

A major approach to study the role early experience plays in human development is to capitalize on opportunities to study children who, through natural circumstances, are exposed to unusual early environments that are deficient in elements thought to be crucial for later development. In particular, children who live in orphanages may be studied while they reside in the institutions, and those children who are subsequently placed in more advantaged environments can provide information on the long term consequences of early adversity as well as the resilience and adaptability of such children to their adoptive homes.

The first source of information on levels of use of institutions for children under 3 years of age comes through survey from European Union's Daphne Programme (from 31 European countries) (Browne *et al.*, 2005; 2006; Johnson *et al.*, 2006) which found that 11 children in every 10,000 lived in residential care institutions. The survey further concluded that 'children were more often institutionalized in economically developing countries for abuse and neglect whereas in developed countries, children are placed in institutional care mainly because of abandonment and disability'.

The second source of data on children in institutions is the UNICEF Innocenti Research Centre's TransMONEE database (UNICEF, 2010). Data from all the sources provide evidence that a substantial number of children reside in institutions all over the world and there are negative effects of institutional care by virtue of institutionalization experienced by inmates of institutions.

Spitz (1945) reported that by the end of second year of institutional care, the DQs had reduced to a low of 45, compared to an average DQ of 100. Goldfarb (1945, 1955) on comparison of 15 children residing in orphanages with those placed in foster care found that even in adolescence, the institutionalized group was intellectually delayed. An increase by 37 points in average IQ in the orphanage children who were placed in personalized care and decrease by 21 points in those who remained in the orphanages was observed by Skeels (1966). Dennis (1973) followed children from a Lebanese orphanage after they were adopted at different ages. He concluded that children who had been adopted before 2 years of age eventually regained normal IQs whereas ones being adopted after 2 years of age showed permanent deficits in IQ.

Lower IQ scores were found by Stock and Smythe (1976), Sloutsky (1997) (in 6 to 7 year old children reared in a Russian orphanage compared to ones residing at homes), Bower (1999) and Chugani et al. (2001). Castle et al. (1999) concluded that higher the rating of psychological deprivation, lower the IQ scores in 129 Romanian orphans. Morison and Ellwood (2000) evaluated children's intellectual development using Stanford-Binet Intelligence Scale, Fourth Edition. They found a clear distinction among the groups, in which the Canadian – born group scored highest (M=109), the early-adopted children scored in the middle (M=99), and the orphanage ones scored lowest (M=91). The orphanage children adopted at later ages (24-60 months old) had the lowest IQs of all (M=68).

De Bellis et al. (1999) pointed out that cortisol is released when the body is under stress and some have elaborated that elevations in cortisol are related to cognitive impairment. Even Chugani et al. (2001) working on Romanian orphans found significantly decreased metabolism bilaterally in the orbital frontal gyrus, the infralimbic prefrontal cortex, the medial temporal structures (amygdala and head of hippocampus), the lateral temporal cortex, and the brain stem. They further pointed out that the dysfunction of these brain systems may be involved in the long-term cognitive and behavioral deficits. Stress and adrenal steroids cause reversible impairments in episodic and spatial memory in animals and humans (Lupien and McEwen, 1997).

Johnson et al. (2006) found that 12 of the 13 studies that considered intellectual development reported that poor cognitive performance and lower IQ scores were associated with children in institutional care, illustrating the negative effects of this environment in comparison to family-based care on the development of the mind.

Chugani *et al.* (2001) elucidated that early institutionalization of children may result in persistent long term specific cognitive and behavioral deficits. The institutionalized children are most vulnerable to developmental delays in social, behavioral and cognitive domains. Institutionalization dampens all areas of development in children (Provence, 1989; Morison *et al.*, 1995; Talbot, 1998; Bower, 1999; Nelson, 2000; O'Connor *et al.*, 2000; Kaur and Singh, 2005; Fischer *et al.*, 2006; Johnson *et al.*, 2006; Rutter *et al.*, 2007 and Kaur and Singh, 2009a; 2009b; 2009c).

In the absence of more physiological studies undertaken by Chugani *et al.* (2001) and Eluvathingal *et al.* (2006), the handful of doctors and researchers who have worked with post-institutionalized children are left to reach conclusions as much by hypothesis as with hard data.

Besides being irreversible, the resulting damage affects a wide range of psychological and social traits. Supporting popular opinion is illustrated in the extreme views of New York City's Mayor Laguardia, who exclaimed, "The worst mother is better than the best institution" (Goodwin, 1994).

This area of research has had several major limitations. A limitation of literature is the total lack of descriptive, especially quantitative information on the backgrounds and developmental status of the children who are relinquished to orphanages. There is complete paucity of literature on IQ in the Indian context, especially a comparative account of IQ of institutionalized and control adolescents. Through this paper, an attempt has been made to assess IQ and study the effect of institutionalization on variations in IQ with age in institutionalized and control adolescents.

Material and Methods

Cross-sectional data were collected on subjects ranging in age from 11 to 17 years, belonging to different areas of Chandigarh (U.T.), Haryana and Punjab through cluster sampling in 2003 and 2004. The data was collected by the author. A total of 1074 subjects (504 institutionalized and 570 control ones) were assessed for IQ. Further efforts were made to study approximately equal number of subjects for the two sexes in the seven age groups. Since the present sample comprised of children of 11 years and above, Raven's Standard Progressive Matrices (SPM) (2000) were used for assessing the intelligence of the adolescents. Mental age was evaluated by comparing the intelligence scores of each subject with the standards given by Raven's Standard Progressive Matrices. The grades were assigned and the intelligence Quotient (IQ) was calculated using the formula:

$$\text{IQ} = (\text{Mental age}/\text{Chronological age}) \times 100$$

The subjects were further classified into 7 categories of IQ based on classification given by Wechsler (1997). Nomenclature (as given by Wechsler) seems to be too judgemental regarding the intelligence of individuals. As a result, the cut-off values have been retained but designations have been ignored in the text.

Results

The institutionalized males were categorized according to their IQ levels into 7 groups (Table 1). None of the subjects were in the IQ above 130 and IQ between 120-130 categories. Out of the three

institutionalized adolescents in the IQ 110-119 category, 2 were in the 11 years age group and 1 in the 15 years. The average IQ category (IQ 90-109) had 15 institutionalized male adolescents distributed through all the age groups except 17 years. A total of 31 subjects residing in orphanages were in the category of IQ 80-89, with 7, 11, 4, 5, 3 and 1 subjects, respectively in the ages of 11, 12, 13, 14, 15 and 17 years. The category of IQ level 70-79 had 67 male adolescents, with the maximum number being in the earlier years i.e. 11, 12 and 13 years. The greater numbers of individuals with significantly low IQ (IQ below 70) were in the later years i.e. 14, 15, 16 and 17 years. This denoted that the IQ level of the institutionalized male adolescents did not increase much with the advancing years.

When the males of the control group were classified on the basis of IQ, it was found that 1, 1 and 3 subjects each in the ages of 11, 12 and 14 years respectively, were in the first category (Table 1). A total of 10 individuals in the age range of 11 to 15 years were in the second category. The bright normal group (IQ 110-119) had 18 subjects, with nearly a little less than half of the individuals in the age group of 11 years. The average category (IQ 90-109) had 76 subjects with the number of males falling under this category increasing with age till 15 years, then decreasing and further again increasing. A sum of 57 and 55 subjects were in the below normal (IQ 80-89) and significantly below normal (IQ 70-79) categories respectively. At all other ages in the controls, the last category subjects were thoroughly distributed.

Table 1. Number of institutionalized and control adolescent males in different categories of IQ

Age (yrs)	Above 130		120 – 130		110 – 119		90 – 109		80 – 89		70 – 79		Below 70	
	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
11±	0	2.50	0	5	5.56	17.50	13.89	17.50	19.44	30	44.44	27.50	16.67	0
12±	0	2.50	0	7.50	0	7.50	8.33	15	30.56	25	41.67	27.50	19.44	15
13±	0	0	0	5	0	2.50	8.33	30	11.11	20	38.89	17.50	41.67	25
14±	0	7.50	0	2.50	0	7.50	2.78	35	13.89	5	22.22	12.50	61.11	30
15±	0	0	0	5	2.78	5	2.78	47.50	8.33	10	11.11	12.50	75	20
16±	0	0	0	0	0	2.50	5.56	12.50	0	27.50	16.67	22.50	77.78	35
17±	0	0	0	0	0	2.50	0	32.50	2.78	25	11.11	17.50	86.11	22.50
Total	0	1.78	0	3.57	1.19	6.42	5.95	27.14	12.30	20.35	26.58	19.64	53.98	21.10

Insti - Institutionalized
Contr – Controls

The institutionalized females were differentiated on the basis of IQ (Table 2). No institutionalized subject was in the highest category of IQ. The superior (IQ 120-130) and above normal (IQ 110-119) category had 1 and 2 subjects. In the latter category, there was 1 subject each at 13 and 14 years. The average IQ category (IQ 90-119) had 20 institutionalized females, with

Table 2. Number of institutionalized and control adolescent females in different categories of IQ

Age (yrs)	Above 130		120 – 130		110 – 119		90 – 109		80 – 89		70 – 79		Below 70	
	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr	Inst	Contr
	%	%	%	%	%	%	%	%	%	%	%	%	%	N (%)
11±	0	2.50	0	0	0	5	8.33	22.50	36.11	32.50	50	32.50	5.56	5
12±	0	5	2.78	5	0	12.50	8.33	12.50	19.44	27.50	19.44	27.50	50	10
13±	0	0	0	4.76	2.78	11.90	13.88	23.81	16.67	7.14	30.56	28.57	36.11	23.81
14±	0	0	0	0	2.78	0	8.33	50	8.33	7.50	30.56	12.50	50	30
15±	0	0	0	0	0	0	8.33	37.50	2.78	12.50	11.11	29.17	77.78	20.83
16±	0	0	0	0	0	0	2.78	27.50	2.78	12.50	2.78	32.50	91.66	27.50
17±	0	0	0	0	0	0	5.56	40	8.33	10	22.22	15	63.89	35
Total	0	1.03	0.39	1.38	0.79	4.13	7.93	30.69	13.49	15.52	23.80	25.52	53.60	21.72

Insti - Institutionalized

Contr – Controls

approximately same number in all age groups except 13, 16 and 17 years. There were 34 adolescent females residing in orphanages in the below normal category (IQ 80-89), with a decreasing trend in the number of individuals with advancing years. The category of IQ of 70-79 had 60 subjects, showing a decrease in the number of subjects with age. There were 135 institutionalized females in the category of IQ below 70, depicting an increase in the number of subjects with an increase in age.

There were 3 and 4 control females respectively in the IQ above 130 and IQ of 120-130 categories (Table 2). The above normal category (IQ 110-119) had 12 control females. All the subjects in the first 3 categories were in the group of 11 to 13 years. There were 89 control female adolescents in the average category (IQ 90-109), with the number of individuals increasing till 14 years, then decreasing followed by an increase thereafter. The below normal category (IQ 80-89) had 45 controls, showing a decreasing trend in the number of subjects with increasing age. The significantly low IQs

were observed in the categories of IQ 70-79 and IQ below 70 which had 74 and 63 control females respectively.

When the two groups of males were compared by Chi- square test, it has been observed that the differences between the two groups were statistically significant except at 12 years. On comparison of female adolescents, it can be concluded that there were statistically significant differences in the institutionalized and controls at all ages except at 11 and 13 years. The differences became more marked with advancing years during adolescence (Table 3).

Table 3. Comparison of the number of individuals in the IQ categories of the institutionalized and controls through Chi – square test

Age (yrs)	Value of χ^2	
	Males	Females
11±	14.18*	6.61
12±	8.55	18.36*
13±	12.90*	7.35
14±	23.04*	16.85*
15±	28.97*	27.21*
16±	18.40*	32.16*
17±	34.17*	13.33*

* $p < 0.05$

Discussion

The present research provides evidence of negative consequences for the institutionalized children, particularly who remain in institutional care for a long duration. Long duration means the years that the children spent in the institutions. Explanations from neurobiology set well besides understandings drawn from attachment theory and start to show the mechanisms for this and also the ability of the brain to compensate (Bilson, 2009).

On the basis of categorization of IQ, the institutionalized males as well as females were lesser in number than their control counterparts from genius to below normal category. Thereafter they outnumbered the controls. More than half of the institutionalized subjects were significantly below the average IQ levels (IQ below 70). The differences between the two groups were statistically significant.

Most of the pioneer research on the developmental consequences of extreme deprivation experienced by institutionalized children focused on intellectual development. Instead of Intelligence Quotient (IQ), Developmental Quotient (DQ) was evaluated in the earlier studies.

The findings of the present study are in conformity with the previously mentioned studies conducted in Europe. Nelson *et al.* (2007) observed that children reared in institutions showed greatly diminished intellectual performance (borderline mental retardation) relative to controls. Johnson *et al.*, (2010) observed delay in growth and IQ in 136 healthy institutionalized children compared to 72 controls. In the Indian context, there is complete lack of such studies. With the increase in age, the number of institutionalized subjects in the average intelligence category goes on decreasing and the number goes on increasing towards the intellectually impaired category. It can be elucidated that there was a backlog in intellectual development in the institutionalized adolescents compared to their control counterparts. More than half of the institutionalized adolescents were definitely far below in intelligence on the basis of IQ categorization.

The lag in cognitive development may be due to institutionalized factors like low nutritional status; larger individual : caregiver ratio ; round the clock stress; lack of opportunities, exposure, stimulation, optimistic approach towards life, zeal to build up one's mental ability; social deficits and stigma. It could be further recommended that intervention programmes of different attributes should be undertaken at various levels to increase the grasping power and learning ability of inmates of orphanages. Along with this, a lot of data should be collected from all over India to make standard percentiles for IQ scoring and intelligence grading of the Indian populations from different parts of the country. Education and training for policy makers and practitioners is urgently needed on the appropriate care and placement of young children facing adversity.

References

- Ainsworth MDS. 1964. Patterns of attachment behavior shown by the infant in interaction with his mother. *Merill-Palmer Quar* **10**: 51-58.
- Bakwin H. 1949. Emotional deprivation in infants. *J. Pediatr* **35**: 512-521.
- Barrera-Moncada G. 1963. Estudios sobre alteraciones del crecimiento y del desarrollo psicologico del sindrome pluricarenal (kwashiorkor) Editora Grafas : Caracas.
- Bilson A. 2009. Use of residential care in Europe for Children aged under three: Some lessons from neurobiology. *British Journal of Social Work* **39**: 1381-1392.
- Bower B. 1999. Kids adopted late reap IQ increases. *Science News* 54.
- Bowlby J. 1951. Maternal care and mental health. *WHO Monogr Ser* **2** : 67.

- Browne KD, Hamilton-Giachritsis C, Johnson R, Chou S, Ostegren M, Leth I, Agathonos-Georgopoulou H, Anaut M, Herczog M, Keller-Hamela M, Klimackova A, Stan V and Zeytinoglu S. 2005. A European survey of the number and characteristics of children less than three years old in residential care at risk of harm. *Adoption & Fostering* **29**(4): 23–33.
- Browne KD, Hamilton-Giachritsis CE, Johnson R, Ostergren M. 2006. Overuse of institutional care for children in Europe. *British Medical Journal* **332**: 485–487.
- Cabak V, Najdanvic R. 1965. Effect of under nutrition in early life on physical and mental development. *Arch Dis Child* **40** : 532-534.
- Casler L. 1961. Maternal deprivation: A critical review of the current literature. *Monogr. Soc Res Child Dev* **26** : 1-64.
- Castle J, Groothues C, Bredenkamp D, Beckett C, O'Connor T, Rutter M, The ERA Study Team 1999. Effects of qualities of early institutional care on cognitive attainment. *Am J Orthopsych*, **69** : 424-437.
- Chugani HT, Behen ME, Muzik O, Juhasz C, Nagy F, Chugani DC. 2001. Local Brain Functional Activity Following Early Deprivation : A study of Post-institutionalized Romanian orphans. *Neuro Image* **14**: 1290-1301.
- Dennis W. 1973. *Children of the crèche*. New York: Appleton – Century – Croft.
- De Bellis MD, Keshavan MS, Clark DB, Casey BJ, Giedd JN, Boring AM, Frustaci K, Ryan ND. 1999. Developmental traumatology. Part II: Brain development. A.E. Bennet Research Award. *Biological Psychiatry* **45**(10): 1271–1284.
- Eluvanthingal HT, Chugani HT, Behen ME, Juhasz C, Muzik O, Maqbool M, Chugani, DC, Makki M. 2006. Abnormal brain connectivity in children after early severe socioeconomic deprivation: A diffusion tensor imaging study. *Pediatrics* **117**: 2093-2100.
- Fischer PA, Gunnar MR, Dozier M, Bruce J, Pears KC 2006. Effects of therapeutic interventions for foster children on behavioral problems, caregiver attachment, and stress regulatory neural systems. *Ann N Y Acad Sci* **1094**: 226-234.
- Gerber M, Dean R. 1956. Psychological changes accompanying kwashiorkor. *Courier* **6** : 3-15.
- Goldfarb W. 1945. Effects of psychological deprivation in infancy and subsequent stimulation. *A J Psych* **102** : 18-33.

- Goldfarb W. 1955. Emotional and intellectual consequences of psychologic deprivation in infancy : A re-evaluation. In Hoch P and Zubins J. (Eds.). *Psychopathology of childhood*. Grune & Stratton, New York. p 105-119.
- Goodwin DK. 1994. No Ordinary Time. Simon and Schuster N.Y.
- Johnson R, Browne K, Hamilton-Giachritsis C. 2006. Young children in institutional care at risk of harm. *Trauma, Violence and Abuse* 7(1) : 1-26.
- Johnson DE, Guthrie D, Smyke AT, Koga SF, Fox NA., Zeanah CH, Nelson CA. 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):507-516.
- Kaur G, Singh SP. 2005. Emotional deprivation and physical growth among adolescents of North West India. *Indian Journal of Physical Anthropology and Human Genetics*, 187-197.
- Kaur G, Singh, SP. 2009a. Impact of Emotional Deprivation on growth of circumferences in adolescents. *Folia Anthropologica* 8; 35-40.
- Kaur G, Singh SP. 2009b. Impact of institutionalization on somatotype among adolescents. *Journal of Life Sciences* 1(1): 15-19.
- Kaur G, Singh SP. 2009c. Somatotypic Variations With Age in Institutionalized and Control Adolescents. *The Internet Journal of Biological Anthropology* 3(1) (Online publication).
- Lupien SJ, McEwen BS. 1997. The acute effects of corticosteroids on cognition: Integration of animal and human model studies. *Brain Research Reviews*, 24:1–27.
- Morison SJ, Ellwood AL. 2000. Resiliency in the aftermath of deprivation: A second look at the development of Romanian orphanage children. *Merrill–Palmer Quarterly* 46: 717–737.
- Morison SJ, Ames EW, Chisholm K. 1995. The development of children adopted from Romanian orphanages. *Merrill–Palmer Quarterly* 1:411–430.
- Nelson R 2000. Developmental status of adopted Chinese children. *Holt International Families Magazine*.
- Nelson CA, Zeanah CH, Fox NA, Marshall PJ, Smyke AT, Guthrie D. 2007. Cognitive Recovery in Socially Deprived Young Children The Bucharest Early Intervention Project. *Science*, 318 (5858):1937 – 1940.

- O'Connor TG, Rutter M, Beckett C, Keaveney L, Kreppner JM, The English and Romanian Adoptees Study Team 2000. The effects of global severe privation on cognitive competence: Extension and longitudinal follow-up. *Child Development* **71**: 376-390.
- Provence S. 1989. Infants in institutions revisited. *Zero to Three* **9**: 1-4.
- Raven J, Raven CJ, Court HJ. 2000. *Standard Progressive Matrices Including the Parallel and Plus Versions*. Sets A, B, C, D and E. Oxford Psychologists Press: Oxford.
- Rutter M, Beckett C, Castle J, Colvert E, Kreppner J, Mehta M, Stevens S, Sonuga-Barke E. 2007. Effects of profound early institutional deprivation: An overview of findings from a UK longitudinal study of Romanian adoptees. *European Journal of Developmental Psychology* **4**(3): 332-350.
- Skeels HM. 1966. Adult status of children with contrasting early life experiences. *Monographs of the society for research on child development* **31**: 105.
- Sloutsky VM. 1997. Institutional care and developmental outcomes of 6- and 7- year old children : A contextual perspective. *Int J Behavior Develop* **20**:131-151.
- Spitz RA. 1945. Hospitalism : An inquiry into the genesis of psychiatric conditions in early childhood. *Psychoanal Stud Child* **1**:53-74.
- Stock MB, Smythe PM. 1976. 15-year Developmental study on effects of severe undernutrition during infancy on subsequent physical growth and intellectual functioning. *Arch Dis Child* **51**: 327-336.
- Talbot M. 1998. That Loving Feeling. *Sydney Morning Herald*. September 19, 1998.
- UNICEF 2010 TransMONEE 2010 Database, UNICEF Regional Office for CEE/CIS, Geneva.
- Wechsler D. 1997. Wechsler Adult Intelligence Scale – Third edition. Psychological Corporation.
- WHO 2009. “WHO Health for all database”, World Health Organization (available at www.who.dk).