EUROPEAN ACADEMIC RESEARCH
Vol. II, Issue 7/ October 2014

Impact Factor: 3.1 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

A comparative study on profile analysis of Binet-Kamat Test of intelligence of children having mild intellectual disability with and without Down syndrome

SUNITA DEVI
PGT Psychology/Counsellor
Rehabilitation Psychologist
Child Guidance Counsellor
St. Mary's School, Dwarka, New Delhi

Abstract:

In this study, BKT subtest profiles of children having mild intellectual disability with Down syndrome were analyzed and compared with the matched group of children having mild intellectual disability without Down syndrome. Binet – Kamat test of intelligence was used to collect the data. The results indicate that children with Down syndrome have poorer performance in all the subtests of BKT except conceptual thinking, numerical reasoning and visuo-motor subtests than their peers without Down syndrome. The correlation among the subtests of Binet-Kamat test of intelligence found to be positive and highly significant. It was suggested that profile analysis enables special educators and rehabilitation professionals to become more aware of individuals learning style and help them to plan and develop the intervention and training programs according to their strengths and limitations.

Key words: intelligence, intellectual disability, Down syndrome

Introduction

Individuals differ from one another in their ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought. Although these individual differences can be substantial, they are never entirely consistent: a given person's intellectual performance will vary on different occasions, in different domains, as judged by different criteria. Concepts of "intelligence" are attempts to clarify and organize this complex set of phenomena (Neisser et al., 1996).

Although considerable clarity has been achieved in some areas, no such conceptualization has yet answered all the important questions and none commands universal assent. Indeed, when two dozen prominent theorists were recently asked to define intelligence, they gave two dozen somewhat different definitions (Sternberg & Detterman, 1986). Such disagreements are not cause for dismay. Scientific research rarely begins with fully agreed definitions, though it may eventually lead to them.

Concept of Intellectual Disability

Garcin (Tassé & Morin, 2003) rightly points out that there are numerous definitions of the state of intellectual disability (which is not an illness – Martin, 2002) and that it is called by various names such as mental retardation, mental handicap, intellectual disability, learning disability, or intellectual disability.

Increasingly, the term intellectual disability is being used instead of mental retardation. This transition in terminology is exemplified by organization names (e.g., the American Association on Intellectual and Developmental Disabilities—AAIDD, International Association for the

Scientific Study of Intellectual Disabilities, President's Committee for People with Intellectual Disabilities), journal titles, and published research (Parmenter, 2004; Schroeder, Gertz, & Velazquez, 2002).

Severe deficit in intellectual ability has historically been the pathognomonic sign of mental retardation. Identification of such deficits is generally based on poor performance on norm-referenced intelligence test batteries. Previous research has established the predictive validity of IQs on various outcomes, such as academic achievement, years of education attained, adaptation to environmental demands, and occupational status in adulthood (e.g., Brody, 1997; Neisser et al., 1996; Wagner, 1997). Thus, these measures appear to be effective in identifying deficits in the global cognitive ability that is most closely associated with social and adaptive functioning. However, in recent years, two notable trends in the assessment of cognitive abilities have emerged that have weakened the reliance on a single score representing global cognitive functioning, the IQ. These trends include (a) the growing emphasis during test development and test interpretation on theories of intelligence that include descriptions of specific cognitive abilities and (b) the increasing prominence of part scores during test interpretation and diagnosis of learning difficulties.

The use of IQs is predicated on research indicating that the construct of general intelligence represents what is typically called intellectual ability or overall cognitive functioning (Jensen, 1998; Spearman, 1927). After over 100 years of study and debate, there is agreement that this higher order ability meaningfully represents the positive relations among more specific measures of cognitive abilities, such as the subtests in intelligence test batteries (Carroll, 1993; Jensen, 1998; Spearman, 1927). In fact, many believe that general intelligence is the most important "active ingredient" in all intelligence tests. It is this ability that is represented well by

IQs from most test batteries, and, thus, it is the foundation of assessment of mental retardation.

Characterising Down syndrome

Down syndrome is a congenital disorder caused by an extra copy of a segment of Chromosome 21 that is associated with specific physical features and cognitive delay (Rondal, 1993:165). There are three subtypes of chromosome anomaly in Down syndrome. First type is the 'standard trisomy 21' that is the presence of three chromosomes 21 instead of two in all body cells. This type accounts for approximately 95% of cases. Second type is the 'translocations'. This type is identical to regular trisomy 21 in terms of the spread of extra chromosomic material in the body cells but not in terms of the casual mechanisms involved and accounts for 4% of cases. The third type is 'mosaicisms' in which certain types of cells contain the extra chromosome but the remainder have the normal number of chromosomes. This type accounts for 1% of cases (Rondal, 1993: 166). Mosaic form is known to give rise to less severe cognitive and possibly linguistic impairments (Perovic, 2001: 432).

Researchers and professionals working with persons with IDs frequently have acted as if they had a single disorder, with similar cognitive functioning for all persons identified as having an ID (Detterman, 1987). Studies seeking specific knowledge of this population have tended to use groups of non-disabled individuals as their comparison samples (McDade and Adler, 1980; Marcell and Armstrong, 1982; Stratford and Metcalf, 1982). This practice is, however, problematic. Children without ID, may have distinctly different family, social and educational experiences than children with ID, and these differences in experience may be reflected in the children's intellectual functioning.

Many studies of persons with Down syndrome have compared with children in the general population (McDade and

Adler, 1980; Marcell and Armstrong, 1982). It is suggested that the choice of a comparison group of children with IDs of other etiologies appears more appropriate, as individuals within this group are more likely to have similar experiences, and therefore represents a more appropriate comparison group. Burack, Hodapp and Zigler, (1988) argue strongly for differentiating individuals with ID by etiology. They suggest that to ignore etiological factors will adversely affect research, by not fully acknowledging the diversity of individuals with ID. Burack et al. suggest that: *There are over 200 identified etiologies of organic intellectual disability and it would be simplistic to believe that the difference between them are insignificant (p.766).*

In the last years, neuropsychological research has permitted defining different cognitive profiles among subjects with mental retardation (MR) of different etiology. Numerous authors have stressed that cognitive profile of individuals with DS is characterized by a remarkable deficit in language abilities that usually exceed impairments in visual–spatial abilities. Several recent studies suggest, however, that a characterization of the cognitive profiles of DS children in terms of a dissociation between language and visual–spatial abilities is too simplistic. Studies from different laboratories have demonstrated a more complex neuropsychological profile in this population, with atypical development not only in the cognitive but also in the linguistic domain (for a review Vicari et al., 2004a, b).

Interest in the cognitive profile of Down syndrome has been robust during the past decades, with a large number of published studies discussing the atypical and unique profile of cognitive abilities in this population. Yet, there is no clear understanding of the cognitive profile of individuals with Down syndrome and how this differentiates from other forms of intellectual disability. The uniqueness of the cognitive make-up of individuals with Down syndrome will contribute to a

better understanding of the specific strengths and impairments of this population, as well as to the development of more effective educational programs suitable for them. (George Grouios and Antonia Ypsilanti,; Genetics and Etiology of Down Syndrome; Edited by: Subrata Dey; Published by InTech (August 2011).

The purpose of the present study is to compare and highlight the strengths, limitations and the relationship between different intellectual aspects of children with and without Down syndrome having mild intellectual disability. Input from this study can be used by the rehabilitation professionals and the special educators for developing the appropriate interventions and training programmes, so that the quality of life of persons with disabilities can be enhanced.

Method

Participants

Eighty children that includes 40 children (20 males and 20 females) having mild intellectual disability with Down syndrome and 40 children (20 males and 20 females) having mild intellectual disability without Down syndrome, aged 6-16 years were selected for the present study. Binet – Kamat test of intelligence was used to collect the data. Children with moderate mental retardation and with other associated disabilities like, Autism, visual impairment, person with cerebral palsy, speech and hearing impaired, suffering with any psychiatric disorder were excluded from the study.The data was collected from *the General services at NIMH, Secunderabad, A.P. (India).*

Measures

Binet-Kamat Test of Intelligence (BKT): This scale is an Indian adaptation of the Stanford-Binet scale of intelligence, prepared in 1934, and standardized by V.V. Kamat in South India

(Bombay-Karnatak region) in 1964, on normal individuals between the age ranges three to ten years and re-evaluated in 1967.

This intelligence scale is age graded and covers ages from three to ten years, then twelve years, fourteen years, sixteen years, nineteen years and twenty two years respectively. The whole test scale comprises of seventy eight main test items and twenty one alternative items. There are six test items and the alternative test items range from one to three at each age level. This test is to be individually administered on each subject. The test items are specific to each age level. Administration of the test starts at the age level of three years and terminates at the level where the subject fails in all the test items of that particular age level.

Function-wise classification of items adapted to the Binet-Kamat Test of Intelligence (Lezak, 1983) have six major categories: **Language** (L) , **Memory** (M) includes meaningful memory (Mm) and non-meaningful memory (NMm), **Conceptual Thinking** (CT), **Reasoning** (R) includes- non-verbal reasoning (NVR), Verbal reasoning (VR) and Numerical Reasoning (NR) , **Visual-motor** (VM) , and **Social Intelligence** (SI). The reliability of the Binet-Kamat test of intelligence is reportedly above 0.7 and the validity of this test for normal children against estimation of intelligence quotient by teachers is 0.5 (Kamat V.V., 1967).

Results

The data was analyzed by using SPSS version 17. Pearson's product moment correlation and the 't'-test were used for the comparison of the means of the of the subtests scores with respect to the group. The results are summarised in table 1, 2, 3, and 4.

Table 1: Result of the't'-test to find out the difference between the subtest scores of the children having mild intellectual disability with and without Down syndrome (n=80).

		With Down syndrome		Without Down syndrome			
	N	**Means**	**SD**	**Means**	**SD**	**t-value**	**Significance**
IQ	40	54.85	4.721	57.78	5.191	2.637	.010**
CA	40	114.28	27.691	134.38	33.766	2.911	.005**
MA	40	62.20	13.781	77.75	21.774	3.817	.000**
Subtests							
L	40	67.55	16.175	83.10	26.120	3.201	.002**
Mm	40	52.50	18.961	75.00	28.077	4.200	.000**
NMm	40	48.00	15.845	71.40	22.890	5.316	.000**
CT	40	17.40	35.426	28.13	40.755	1.256	.213
NVR	40	61.20	14.068	71.70	26.275	2.228	.029*
VR	40	.00	.000	7.20	31.784	1.433	.156
NR	40	58.50	25.950	76.50	30.222	2.858	.005**
VM	40	51.30	20.871	54.30	30.502	.513	.609
SI	40	74.10	15.345	91.50	24.860	3.767	.000**

* Significant at 0.05 level of significance (p< 0.05), ** highly significant at 0.01 level of significance (p< 0.01)

Table 1 reveals the mean scores and standard deviations of both the children having mild intellectual disability with and without Down syndrome on a measure of scores of BKT subtests and IQ, CA and MA. The 't'-value for IQ, CA, MA, Language, Meaningful memory, Non-Meaningful memory, Numerical Reasoning and Social Intelligence are highly significant at 0.01 level of significance (p<0.01) and Non-Verbal Reasoning is significant at 0.05 level of significance (p<0.05).

Table 2: Inter-correlation among the BKT subtests for the children having mild intellectual disability with Down syndrome (n = 40).

Correlations									
Subtests	**L**	**Mm**	**NMm**	**CT**	**NVR**	**VR**	**NR**	**VM**	**SI**
L	1	.625**	.408**	.583**	.582**	.[a]	.661**	.519**	.715**
Mm		1	.614**	.644**	.519**	.[a]	.689**	.456**	.703**
NMm			1	.263	.398*	.[a]	.440**	.424**	.501**
CT				1	.387*	.[a]	.567**	.370*	.624**
NVR					1	.[a]	.612**	.414**	.706**
VR						.[a]	.[a]	.[a]	.[a]

NR							1	.643**	.806**
VM								1	.646**
SI									1

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed), a. Cannot be computed because at least one of the variables is constant.

Table 2 reveals the correlation among all the nine subtests scores of the BKT of children having mild intellectual disability with Down syndrome (n = 40). The Pearson correlation coefficient computed between nine subtests of BKT reveals the correlation to be high and positive in all the subtests except the non-meaningful memory and conceptual thinking (r = .263).

Table 3: Inter-correlation among the BKT subtests for the children having mild intellectual disability without Down syndrome (n = 40).

Correlations									
Subtests	**L**	**Mm**	**NMm**	**CT**	**NVR**	**VR**	**NR**	**VM**	**SI**
L	1	.829**	.549**	.501**	.645**	.542**	.660**	.624**	.773**
Mm		1	.669**	.492**	.652**	.372*	.763**	.620**	.782**
NMm			1	.517**	.632**	.250	.719**	.460**	.735**
CT				1	.567**	.319*	.543**	.440**	.695**
NVR					1	.321*	.606**	.445**	.637**
VR						1	.242	.226	.266
NR							1	.717**	.799**
VM								1	.720**
SI									1

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed), a. cannot be computed because at least one of the variables is constant.

Table 3 reveals the correlation among all the nine subtests scores of the BKT of children having mild intellectual disability without Down syndrome (n = 40). The Pearson correlation coefficient computed between nine subtests of BKT reveals the correlation to be high and positive in all the subtests except between the non-meaningful memory and verbal reasoning (r = .250), numerical reasoning and verbal reasoning (r = .242), verbal reasoning and visuo-motor (r = .226) and verbal reasoning and social intelligence (r = .266).

Table 4: Inter-correlation among the BKT subtests for the combined group (n = 80).

Correlations									
Subtests	**L**	**Mm**	**NMm**	**CT**	**NVR**	**VR**	**NR**	**VM**	**SI**
L	1	.798**	.582**	.534**	.656**	.483**	.688**	.576**	.788**
Mm		1	.726**	.547**	.642**	.344**	.760**	.537**	.798**
NMm			1	.428**	.595**	.256*	.657**	.414**	.726**
CT				1	.511**	.257*	.565**	.414**	.657**
NVR					1	.310**	.623**	.434**	.678**
VR						1	.222*	.193	.269*
NR							1	.669**	.814**
VM								1	.663**
SI									1

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed), a. cannot be computed because at least one of the variables is constant.

Table 4 reveals the correlation among all the nine subtests scores of the BKT for the combined group (n = 80). The Pearson Correlation Coefficient was computed between the nine subtests and it was found that the correlation was high and positive between all the subtests except the verbal reasoning and visuo-motor (r = .193) for the combined group.

Discussion

The main purpose of this study was to study and compare the profile analysis of children having mild intellectual disability with and without Down syndrome on Binet-Kamat test of intelligence (1967).

The descriptive statistical measures (Mean and SD) were used in order to find the differences between the two groups and to find the differences of domains. The inferential statistical (t-test) measures were used for comparing the means of the subtests scores with respect to diagnosis (with and without DS having mild ID). Although both groups (Mild MR with DS and without DS) were homogenous in terms of the

chronological age range (6-16 years) and degree of mental retardation/intellectual disability (mild level 50-69 IQ) yet there was a significant difference found in the means of chronological age (CA), the mental age (MA) and the intelligence quotient (IQ).

The results revealed that the mean scores and standard deviation of both group on a measure of scores of BKT subtests (Language, Meaningful memory, Non-meaningful memory, Numerical Reasoning and Social intelligence are highly significant at 0.01 level of significance ($p<0.01$) and Non-Verbal Reasoning is significant at 0.05 level of significance ($p<0.05$), that indicates the subtest scores of the children with and without Down syndrome having mild intellectual disability are significantly different on Binet-Kamat test of intelligence (BKT). The result of this study is in concordance with the earlier researches which indicated that the adults with Down syndrome exhibited significantly poorer linguistic ability than the adults with mental retardation of unknown etiology. Though the two groups exhibited different cognitive profiles, differences in cognitive abilities could not account for the difference in linguistic ability (Keith T. Kernan, Sharon Sabsay, 1996). Bower, A. and Hayes, A. (1994) found a significant difference between the two groups for short term memory scores on the SB4, indicating that on short term memory tasks children with DS function at a significantly lower level, than a group of children with ID/OE. Differences between visual and auditory short -term memory sub-scores for the two groups also were identified, with significantly lower scores for auditory short -term memory for the group with DS. Finally it was established that while the SB4 appears to be a suitable instrument for the identification of ID, the test is limited in its range of short -term memory subtests for young children with DS. Spreen (1965) found that forty five percent of the mildly mental retarded population was impaired in their language skills. The conceptual ability of person with mental retardation

had significantly inferior to normal in their ability to abstract, generalize, and verbalize concepts (Srividya, G. and Kalanidhi, M.S., 1974).

In the present study, the Pearson Correlation Coefficient reveals that the statistically there is high and positive correlation between all the subtests except the verbal reasoning and visuo-motor for the combined group. The Pearson Correlation Coefficient between language and memory (r = .798) and language and social intelligence (r = .788) which were the highest among other subtests shows that there is high and positive relationship i.e. increase in one may leads to increase in other two and vice-versa. The Pearson Correlation Coefficient reveals that the statistically there is no significant correlation found between verbal reasoning and visuo-motor (r = .193). This could be attributed to the reason that these skills are acquired relatively at a higher age. For example the items to measure verbal reasoning starts at the age of 12 years which is achieved hardly by few children of mild intellectual disability. Kurdek A. Lawrence and Sinclair J. Ronald (2001) found in their study that older children had higher verbal skills and visuo-motor skills than younger. Children students' mean age was 11.22 years (SD = 0.35; range = 10.48—12.05 years). (This study was done on the typically developing children).

The results reveal the correlation among all the nine subtests scores of the BKT of children having mild intellectual disability with Down syndrome (n = 40). The Pearson correlation coefficient computed between nine subtests of BKT reveals the correlation to be high and positive in all the subtests except the non-meaningful memory and conceptual thinking. The Pearson Correlation Coefficient between language and social intelligence (r = .715) and memory and social intelligence (r = .703) which were the highest among other subtests shows that there is high and positive relationships i.e. if a child has good language skills, it may help him in developing good social intelligence and memory and vice

versa. There are studies which are in accordance with the results of the present study. Buckley SJ, Bird G, Sacks B.(2002), reported that children's social development is influenced by their understanding of the world around them and the behaviour of others, therefore children with delayed cognitive (mental) development are likely to have more difficulty in becoming socially competent and in controlling or self-regulating their behaviour. Children's rate of progress with language development will also influence all aspects of their social development.

The result reveals the correlation among all the nine subtests scores of the BKT of children having mild intellectual disability without Down syndrome (n = 40). The result reveals the correlation to be high and positive in all the subtests except between the non-meaningful memory and verbal reasoning (r = .250), numerical reasoning and verbal reasoning (r = .242), verbal reasoning and visuo-motor (r = .226) and verbal reasoning and social intelligence (r = .266).

Overall, all the groups varied in the performance when all the subtests were considered. In the present study, we compared and investigated the cognitive ability profiles of children with mild intellectual disability with and without Down syndrome. Improving the understanding of the patterns of performance of individuals with intellectual disability across a variety of reliable part scores based on theories describing the structure and relations between cognitive abilities is important for a number of reasons. First, psychologists and other practitioners may be called to examine, in addition to IQs, collections of part scores from individuals with or suspected of having mental retardation. Second, examining these patterns of performance appears to represent the most advanced and sensitive method for gauging the cognitive abilities of individuals. Third, use of part scores may be beneficial for instructional or vocational applications. Thus, consistent with Detterman's systems theory, well-constructed profiles of part

scores may provide insight into the functioning of the system parts and their contributions to global system functioning in a manner that is beneficial to the individual being assessed.

REFERENCES

Abbeduto L., Pavetto M, et.al. (2001); the linguistic and cognitive profile of Down syndrome: Evidence from a comparison with Fragile X syndrome. Down syndrome Research and Practice, 7 (1), 9-15.

Bergeron R. and Floyd G. R (2006); Broad Cognitive Abilities of Children with Mental Retardation: An Analysis of Group and Individual Profiles. American journal of Mental Retardation, vol.III (2006), 417-432.

Bower, A. and Hayes, A. (1994); Short-term memory deficits and Down's syndrome: A comparative study; Down Syndrome Research and Practice 1994, vol.2, Nov.2, 47-50.

Buckley SJ, Bird G, Sacks B. Social development for individuals with Down syndrome - An overview. Down Syndrome Issues and Information. 2002.

Burack, J.A., Hodapp, R.M., and Zigler, E. (1988); Issues in the classification of mental retardation: Differntiating among organic etiologies. Journal of child psychology and psychiatry, 29, 765-779.

Byrne A., Buckley S., MacDonald J. and Bird G. (1995); Investigating the literacy, language and memory skills of children with Down's syndrome. Down Syndrome Research and Practice 1995, Vol.3 (2) 53-58.

Cebula K. R., Moore D. G. and Wishart J. G. (2009); social cognition in children with Down's syndrome: challenges to research and theory building. Journal of Intellectual Disability Research: 2009 Blackwell Publishing Ltd.

Couzens Donna, Cuskelly Monica, and Haynes Michele (2011); Cognitive Development and Down syndrome: Age-Related Change on the Stanford - Binet test (Fourth Edition). American Journal on Intellectual and Developmental Disabilities: May 2011, Vol. 116, No. 3, pp. 181-204.

Detterman, d. (1987); Theoretical notions of intelligence and Mental retardation. American journal of Mental deficiency, 92, 2-11.

Dykens EM, Hodapp RM, Evans DW (2006); Profiles and development of adaptive behaviour in children with Down syndrome. Down Syndrome Research and Practice. 2006; 9(3); 45-50.

Edgin JO, Pennington BF, Mervis CB (2010); Neuropsychological components of intellectual disability: the contributions of immediate, working, and associative memory; Journal of Intellectual Disability Research, 2010 May; 54(5):406-17.

George Grouios and Antonia Ypsilanti (2011); Language and Visuospatial Abilities in Down syndrome Phenotype: A Cognitive Neuroscience Perspective (ch-15); Genetics and Etiology of Down Syndrome; Edited by: Subrata Dey; Published by InTech (August 2011).

Goel, S.K. and Sen, A.K. (1981); Psychological Assessment of the Mentally Retarded and evaluation of the tests. Indian Journal of Mental Retardation, 14, 19-26.

Jayshankarappa, B.S. (1986); Intellectual tests and social adaptive behavioural scales used for the assessment of mentally handicapped in India. Indian Journal of personality and clinical studies, 2, 84-98.

Kamat V.V: Measuring intelligence of Indian children 4th edition. Oxford university press; 1967.

Keith T. Kernan, Sharon Sabsay (1996); Linguistic and cognitive ability of adults with Down syndrome and mental retardation of unknown etiology; Journal of

Communication Disorders, Vol. 29, Issue 5, September-October 1996, Pages 401-422.

Kurdek A. Lawrence and Sinclair J. Ronald (2001); Predicting Reading and Mathematics Achievement in Fourth-Grade Children From Kindergarten Readiness Scores; Journal of Educational Psychology September, Vol. 93, No. 3, 451-455.

Moore DG, Oates JM, Hobson RP, Goodwin J. Cognitive and social factors in the development of infants with Down syndrome. Down Syndrome Research and Practice. 2002; 8(2);43-52.

Nye Joanna, Clibbens John and Bird Gillian (1995); Numerical ability, general ability and language in children with Down syndrome, Down Syndrome Research and Practice1995, 3(3)92-102.

Rondal A. Jean (1998); cases of exceptional language in mental retardation and Down syndrome: Explanatory perspectives. Down syndrome Research and Practice. Vol.5 (1); 1-15.

Shepperdson B. Attainments in reading and number of teenagers and adults with Down syndrome. Down syndrome Research and Practice. 1994; 2(3); 97-101.

Snowling J. Margaret, Nash M. Hannah and Henderson M. Lisa (2008); the development of literacy skills in children with Down syndrome: Implications for intervention. Down syndrome Research and Practice, Published online: 28 April 2008.

Srividya, G. and Kalanidhi, M.S. (1974); A study of the conceptual ability of normal and mentall retarded children. Manasi, 21, 33-36.

Tsakiridou Marina (2006); the linguistic profile of Down's syndrome subjects: evidence from wh-movement construction. SOAS Working Papers in Linguistics Vol. 14 (2006): 227-248.

Tuomo Määttä, Tuula Tervo-Määttä, Anja Taanila, Markus Kaski and Matti Iivanainen (2006); Mental health, behaviour and intellectual abilities of people with Down syndrome; Down Syndrome Research and Practice 11(1), 37-43.

Varma S.K. (1971); Intelligence Assessment in the mentally retarded: some experiences. Indian Journal of Mental Retardation, 4, 10-14.

Venkatesan, S. (1987); profile analysis on Binet-Kamat Test: A comparative study on groups of mentally retarded individuals. Unpublished D.M.&S.P. Manglore, Dissertation submitted to Banglore University.

Vicari S. (2001); Implicit versus explicit memory function in children with Down and Williams syndrome. Down syndrome Research and Practice. 2001; 7(1); 35-40.

Vicari S. (2006); Motor Development and Neuropsychological Patterns in Persons with Down Syndrome; Behavior Genetics, Vol. 36, No. 3, May 2006.

Vicari, S., Albertini, G. & Caltagirone, C. (1992); Cognitive Profiles in Adolescents with Mental Retardation. Journal of Intellectual Deficiency Research, Volume 36, Issue 5, pages 415–423, October 1992.

William, M. Wilson (1992); The Stanford-Binet: Fourth edition and Form L-M in Assessment of young children with mental retarded. Journal of mental retardation, 30 (2), 81-85.