ISSN : 1906-0653

ICER2013

ASEAN Education in the 21st Century

The 6th International Conference on Educational Reform 2013

February 23-24,2013 at Sokha Angkor Resort, Siem Reap ,Cambodia

Contents

Proceedings of the 6th International Conference on Educational Reform (ICER 2013):
ASEAN Education in the 21st Century

Effects of Age, Gender and IQ on Adaptive Behavior in Children with Down Syndrome

Nguyen Tuan Vinh & Nguyen Phuoc Cat Tuong
College of Education, Hue University, Vietnam

Abstract

Previous research has looked for the different patterns of adaptive skills according to age, gender and IQ in children with Down syndrome, but the findings remain inconclusive. This present study was devised to explore these issues in more details. Domains scores from the Adaptive Behaviour Scale – School 2nd Edition (ABS- S:2) were compared in relation to gender, age and IQ for 30 children with Down syndrome in Hue City. Only the skills related to Language Development, Number and Time, and Community Self – Sufficiency seemed to improve with age. There was a significant gender difference only in Social Engagement domain. IQ was significantly correlated with 4 out of 16 ABS-S:2 domains. Thus, there was still not much strong evidence that age, gender and IQ affect the adaptive behavior composite of children with Down syndrome. Some limitations of the present study were also discussed.

Keywords: Adaptive behavior, Down syndrome, Age, Gender, IQ

Introduction

The American Association on Intellectual and Developmental Disabilities (AAIDD) defines adaptive behavior (AB) as "the conceptual, social, and practical skills that people have learned to be able to function in their everyday lives." Significant limitations in adaptive behavior impact a person's daily life and affect the ability to respond to a particular situation or to the environment (AAIDD website, 2008). Adaptive behavior can also be considered as the effectiveness with which individuals meet the standards of personal independence and social responsibility expected of individuals of their age and cultural group (AAMR, 1992). The measurement of adaptive behavior provides vital information for the understanding of individuals with developmental disorders, the planning of intervention programs and the monitoring of progress for children with disabilities. Thus, different from the past when only IQ is the only construct, greater emphasis has now been placed on adaptive behavior in measurement and recognition of intellectual disability. Intellectual disability is now defined as "a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior, which covers many everyday social and practical skills. This disability originates before the age of 18" (AAIDD website, 2008). That low intelligence is a necessary, but insufficient, indicator of mental retardation is seen as the impetus for mandates to consider adaptive functioning, in conjunction with intelligence, when diagnosing intellectual disability (Paskiewicz, 2009).

In recent years, some instruments for characterizing adaptive behavior have been developed. The year 2013 will witness the presence of the AAIDD's new Diagnostic Adaptive Behavior Scale (DABS) which provides a comprehensive standardized assessment of adaptive behavior (AAIDD website, 2012). Until then, Adaptive Behavior Scale – School 2nd Edition (ABS-S:2) (Lambert, Nihira, & Leland, 1993);

Adaptive Behavior Assessment System (ABAS, ABAS-II—Harrison, & Oakland, 2000, 2003) and the The Vineland Adaptive Behavior Scale (VABS; Sparrow, Cicchetti, & Balla, 2005), have been widely used in scholarly works on children with intellectual disability since they have shown good reliability and validity and have demonstrated clinical usefulness (Schatz & Hamdan-Allen, 1995).

A number of studies have used the ABS – S:2, ABAS, ABAS-II and VABS to explore differences in adaptive behavior between girls and boys, young and old children with Down syndrome; children with high IQ and children with low IQ These studies have shown similar results as well as many complicated discrepancies across the studies. Moreover, many studies examining have failed to be effective, or are methodologically faulted as a result of sample bias or small sample size (Owenset et al., 1971; Dalton et al., 1974; Dalton & Crapper, 1977; Thase et al., 1982, Haxby, 1989, cited by Collacott, 1992).

Firstly, in terms of age – related changes, some studies failed to demonstrate the effects of age on adaptive skills of people with Down syndrome. For example, Fidler, Hepburn, and Rogers (2006) found out that toddlers with Down syndrome did show emerging areas of relative strength and weakness (included relatively stronger social skills, weaker expressive language, and poor motor coordination) similar to that which has been described in older children and young adults with Down syndrome. Silverstein, Herb, Nasuta, and White (1986) studied 143 people with Down syndrome and ended up in the conclusion that "there was little evidence that age differentially affects the adaptive behavior of mentally retarded persons with and without Down syndrome". On the other hand, significant differences in adaptive functional skills between younger and older people with Down syndrome have been shown in many studies. However, the findings were not always consistent. For example, Ziginan et al. (l987, cited by Collacott, 1992) studied 2l44 people with Down syndrome, and found that cognitive and adaptive skills regressed with age. However, such regression did not occur until the sixth decade. Fenner et al. (l987, cited by Collacott, 1992) pointed out that cognitive and self-care skills declined in those aged over 35 years; and just only one-third of those with Down syndrome showed such changes. A five – year follow up study of adaptive behavior in adults with Down syndrome by Collacott and Cooper (1997) proved that loss of skills was found to increase with age and were common over the age of 40 years. Dykens, Hodapp, and Evans (2006) found out that one to 6-year-old children showed significant age-related gains in adaptive functioning, but older subjects showed no relation between age and adaptive behavior. Besides, some longitudinal studies reported that adults from 20 to 30 years showed the highest performance for all age groups among individuals with DS (Dressler et al., 2010, Bertoli et al., 2011, cited by Määttä, 2011); the cognitive and functional abilities of adults with Down syndrome were either stable throughout adulthood or stable until around age 40 and declined thereafter (Määttä, 2011).

Secondly, regarding to the effects of gender on the ability of people with Down syndrome, the inconsistence of the findings has remained. No gender differences were found in a longitudinal study by Prasher, Chung, and Haque (1998). This reported finding was confirmed by Taylor (2008) who found out that males and females did not differ on the percentile rank scores of the adaptive behavior composite. On the other hand, Määttä, Tervo-Määttä, Taanila, Kaski and Iivanainen (2006) pointed out that females had better cognitive abilities and speech production compared with males; males had more behavioral problems than females. Ornoy, Rihtman, and Parush (2011) also found sex differences on the short-term memory and motor function, with females performing better than males. However, functional sex differences on the specific VABS measures of copying, handwriting and free writing were not found.

Thirdly, regarding to the IQ performance on adaptive behavior in children with Down syndrome, the most common finding is that IQ of children with Down syndrome is related to their success at implementing functional components and participating in specific activities. Fiddler et al. (2005), Vicari (2006), Vicari and Carlesimo (2006) (cited by Määttä, 2011) found out that the cognitive limitations of individuals with Down syndrome had an important influence on the level of independent functioning attained and a significant correlation between IQ and all areas of function has been noted. In a study by Rithman et al. (2009), there was a significant correlation between IQ and different neurodevelopmental and adaptational measures (visual–motor integration and adaptive behavior). However, this correlation has still remained complex. For persons with mild mental retardation, some people showed IQ below 70 and had adaptive deficits, whereas others showed IQ below 70 and had no adaptive deficits (Mash, Barkley & Heffernan, 2002).

This existing literature remains inconclusive regarding to the differences in adaptive behavior that occur with age, gender and intelligence in people with Down syndrome. This present study was devised to study these issues in more details. The study investigated how the factors of age, gender and IQ affect adaptive behavior in children with Down syndrome, which critically contribute to the development and implementation of individual educational plan for the suffering children.

Method

Participants

Participants were 30 children with Down syndrome from special education schools in Hue City, Vietnam. All of them lived with their families and went to school full – time from Monday to Friday.

The sample consisted of 21 males and 09 females aged between 6 and 13 years (mean = 9.7, SD = 2.12). They were divided into two groups, the first group included 14 children aged 6 to 9 and the second one included 16 children aged 10 to 13.

MeasuresAAIDD's Adaptive Behavior Scale – School, second edition/ABS-S:2 (Lambert et al., 1993)

Parents, teachers and care – givers completed the AAIDD's Adaptive Behavior Scale – School, second edition/ABS-S:2 by Lambert et al. (1993). This scale was designed to evaluate the adaptive and maladaptive behavior of children between aged 3 and 18–21 years with 16 domains and 5 factors. Though the scale has not been officially adapted into Vietnamese settings, Tran's (2005) Vietnamese version has shown to be a reliable measure for assessing adaptive behavior in children with disabilities. It has been widely used in Vietnam since 2003. In the present study, the scale's reliability was demonstrated with high internal consistency, determined by Cronbach's alpha coefficient of .91.

Goodenough draw - a - person test

Goodenough Draw - a - Person Test (Goodenough, 1926) was used to infer children's cognitive developmental levels with little or no influence of other factors such as language barriers or special needs. Not limited by time, children were asked to draw a man, a woman, and themselves. No further instructions were given and the child was free to make the drawing in whichever way he/she would like. There was no right or wrong type of drawing, although the child must make a drawing of a whole person each time - i.e. head to feet, not just the face. The Draw-a-Person: QSS (Quantitative Scoring System) was used to evaluate children's intelligence. This system analyzes fourteen different aspects of the drawings (such as specific body parts and clothing) for various criteria, including presence or absence, detail, and proportion. Thirty children with Down syndrome were divided into three levels of retardation based on IQ as defined by the Diagnostic and Statistical Manual of Mental Disorders**,** fourth edition, text revision (the DSM-IV-TR) including mild (3 children), moderate (24 children) and severe

level (3 children).

Statistical analysis

Independent sample *t*-tests were performed to assess age group and gender differences in adaptive behavior of 30 children with Down syndrome. Pearson coefficient correlations were calculated to assess the correlations between their adaptive behavior and IQ.

Results

General levels of adaptive behavior in children with Down syndrome

In order to assess the level of independence achieved for given adaptive skills in children with Down syndrome, some descriptive statistical data were necessarily used. Means, standard deviations and ratings for the 16 domains, and 5 factors of adaptive behavior of children with Down syndrome by the ABS-S:2 were computed and are presented in Table

Table 1: Means, Standard Deviations and Rating of Adaptive Behavior for the Group

Domains	Mean	SD	Rating
I. Independent Functioning	10.2	1.27	Average
II. Physical Development	15.3	1.66	Superior
III. Economic Activity	7.0	1.68	Below Average
IV. Language Development	7.0	1.92	Below Average
V. Numbers and Time	8.0	1.74	Average
VI. Prevocational/Vocational Activity	10.5	2.29	Average
VII. Self-Direction	9.3	1.70	Average
VIII. Responsibility	8.9	1.70	Average
IX. Socialization	9.3	1.78	Average
X. Social Behavior	11.8	2.71	Average
XI. Conformity	11.3	3.14	Average
XII. Trustworthiness	11.4	3.23	Average
XIII. Stereotyped and Hyperactive Behavior	11.9	2.15	Average
XIV. Self-Abusive Behavior	11.1	1.81	Average
XV. Social Engagement	10.7	1.84	Average
XVI. Disturbing Interpersonal Behavior	11.9	2.06	Average
Factors			
A. Personal Self-Sufficiency	116.5	11.4	Above Average
B. Community Self-Sufficiency	89.4	8.0	Below Average
C. Personal-Social Responsibility	99.3	9.9	Average
D. Social Adjustment	99.8	12.7	Average
E. Personal Adjustment	105.2	11.8	Average

As can be seen from Table 1, most of domains and factors of adaptive behavior in children with Down syndrome reached the average levels. Out of these domains and factors, the domain of Physical Development was rated “superior” and the factor of Personal Self-Sufficiency was above average.

The domains of Economic Activity, Language Development and the factor of Community Self-Sufficiency were below average. It was noticed that in spite of being rated as average, the domain of Numbers and Time had significantly lowest score among the same rating domains.

Age – related changes in adaptive behavior of children with Down syndrome

To compare the performance level of adaptive skills of 6 – 9 year old group and 10 – 13 year old group, independent sample *t*-tests were calculated. Of 16 domains and 5 factors given, the *t* test revealed significant age differences in only three domains and one factor **(**as in Table 2). Children aged 10 through 13 scored significantly higher than children between the ages of 6 -9 years in the domains of Language Development, Numbers and Time and the factor of Community Self-Sufficiency but scored significantly lower in the domain of Conformity.

The findings revealed that older children performed better in the adaptive skills related to language acquisition, number and time concepts and were more independent and autonomous in community activities than young children with Down syndrome. However, they tended to show more impudence, tardiness and misbehavior than the young ones

Table 2. The ABS-S:2 Domain Age Equivalent Scores

Domains/Factors	Age Group 1 (6-9 years)		Age Group 2 (10-13 years)		*t*(28)
	Mean	SD	Mean	SD	
IV. Language Development	6.64	1.39	8.56	1.89	3.12**
V. Numbers and Time	6.92	0.99	8.93	1.73	3.81**
XI. Conformity	12.78	3.42	10.06	2.29	2.58**
B. Community Self-Sufficiency	85.00	8.04	93.18	5.89	3.20**

Note: ** p < .01

Gender differences in adaptive behavior of children with Down syndrome

In order to examine gender differences in adaptive behavior of children with Down syndrome, independent sample *t*-tests were also performed. The *t* test showed that only the domain of *Social Engagement* was found to be significantly different between boys and girls with Down syndrome (as in Table 3).

The findings suggested that girls tended to be shier, more inactive and withdraw from activities more occasionally than boys with Down syndrome. However, in this study, results showed that girls did show emerging areas of relative strength and weakness similar to those which have been described in boys with Down syndrome

.

Table 3. *The ABS-S:2 Domain Gender – Equivalent Scores*

Domains/Factors	Male		Female		*t*(28)
	Mean	SD	Mean	SD	
XV. Social Engagement	11.1	1.50	9.66	2.17	2.21*

Note: * p< .05

The correlation between IQ and Adaptive behavior in children with Down syndrome

In order to explore the effects of intelligence performance on the levels of adaptive behavior in children with Down syndrome, the Pearson coefficient correlations were calculated. The Pearson coefficient index showed that out of the total of 16 domains and 5 factors, only three domains had significant correlation with IQ performance.

Language Development and Responsibility were positively correlated with IQ performance while Stereotyped and Hyperactive Behavior were negatively correlated with IQ performance. The results are presented in the Table 4 below

Table 4. The Correlation between IQ and Adaptive Behavior in Children with Down Syndrome

Domains/Factors	IQ
IV. Language Development	.397*
VIII. Responsibility	.447*
XIII. Stereotyped and Hyperactive Behavior	-.371*

Note. * $p < .05$

The results revealed that children with higher IQ showed more proficiency in communication and tended to acquire receptive and expressive language better as well as utilize these skills more effectively than those with lower IQ. Besides, children with higher IQ also were better at dealing with taking care of their possessions and demonstrated more responsibility with regard to carrying out assigned tasks, being punctual, and maintaining self – control than those with lower IQ. More importantly, it seemed that less inappropriate physical contact and fewer stereotypical manners were found in children with Down syndrome who have high intelligence performance.

Discussion

Adaptive behavior is composed of a number of coping skills that, when combined, allow an individual to achieve community integration (Lambert et al., 1993). Adaptive behavior deficiencies prevent an individual from coping with societal demands. The emphasis, therefore, has been placed on the importance of the results of adaptive behavior measurement for children with Down syndrome, which would provide critical information for the building up of individual service plans and individual education plans.

Along with previous studies, this study firstly assessed the general level of adaptive behavior of children with Down syndrome. Consistent with several previous findings (Miller, 1992, Sigman, & Ruskin, 1999, Brigstocke, Hulme & Nye, 2006), the research results suggested that children with Down syndrome tended to show deficiencies in the domains of *Language Development, Numbers and Time and Economy Activities* and the factor of *Community Self – Sufficiency*. The combination of skill deficits and performance deficits related Language Development, Numbers and Time and Economy Activities seemed to prevent children with Down syndrome from interacting with other people and use community resources. The Pearson coefficient correlations also showed that there was a close relationship between the three mentioned domains and the factor of Community Self-Sufficiency with $r = .394$ ($p<.05$), $r =.819$ ($p<.01$) and $r = .617$ ($p<.01$) respectively. These findings basically suggested that individual education plans for children with Down syndrome should focus on the development of expressive and receptive language capabilities, vocabulary and grammar, basic competencies such as telling time, performing basic arithmetic skills as well as economy activities such as handling money, using bank services and purchasing goods in stores.

The main aim of this present study was to explore the effects of age, gender and IQ on adaptive behavior in children with Down syndrome.

As regards the age – related changes, though little evidence was found, this present study seemed not to support the findings of Dykens et al. (2006) which demonstrated that one to 6-year-old children showed significant age-related gains in adaptive functioning, but older subjects showed no relation between age and adaptive behavior or that there were no changes in behavior between the groups

(age, cognitive) on levels of adaptive behavior (Adams & Oliver, 2010). The finding revealed that in the older group (aged 10 -13 years) acquire higher levels of performance skills in the domains of Language Development, Numbers and Time and the factor of Community Self-Sufficiency but retain lower levels in the domain of Conformity compared to the younger one (aged 6 – 9 years) . This result might confirm the findings of Rihtman et al. (2010) which showed the better improvements in of older children with Down syndrome in the performance of daily life activities.

More specifically, in terms of language development, a recent study by Robyn Chapman and colleagues in the development of expressive syntax in 49 children with Down syndrome aged from 5 to 20 years (Chapman et al. 1992, cited by Buckley, 1993) produced evidence to contradict Fowler's view that there is a ceiling on linguistic development. The length of utterances produced increased with age and the older children with Down syndrome showed continuing syntactic development up to 20 years of age. In regard to the domain of Number and Time, number skills in children with Down syndrome appear to improve with age (Turner & Alborz, 2003; Sloper, Cunningham, Turner & Knussen, 1990; Thorley & Woods, 1979). Besides, language skills are related to achievement in number skills in children with Down syndrome (Porter, 1999; Caycho, Gunn & Siegal, 1991; Irwin, 1989). However, the relationship between achievement levels and mental age in children with Down syndrome is not consistent so far in all studies. Findings should be replicated in future research. More reasonably, the better development of skills related to language acquisition, number and time concepts, the older children with Down syndrome were more likely to be more independent and autonomous in community activities. That is why they scored significantly higher than children between the ages of 6 -9 years in the factor of Community Self-Sufficiency. This finding might confirm the results of the study by Buckley, Bird, and Sacks (2002) which provided the evidence that by late teenage and early adult years, most young people with Down syndrome do achieve a high level of autonomy in daily personal care and in activities outside home. However, these researchers also claimed that many still need supervision.

However, with the lower significant score in the domain of *Conformity*, the older children with Down syndrome in this group showed to be more stubborn and have more challenging behavior than the younger ones. This finding seemed to be contractive to the previous research studies which show that the incidence of behavior difficulties for almost all children with Down syndrome falls steadily with age as the children's ability to understand and to communicate improves. However, Buckley, Bird and Sacks (2002) also pointed out that most children and teenagers with Down syndrome have age-appropriate social behavior, but some children do develop difficult behaviors. Besides, this discrepancy also might be due to the small sample size of this current study and might reflect wide individual differences.

In terms of the effects of gender on adaptive behavior, the results of this study fail to support the possibility of gender changes in adaptive behavior profiles for children with Down syndrome. There was only the evidence that boys scored significantly higher in the domain of Social Engagement than girls with Down syndrome. Girls tend to be more inactive and shier and withdraw from social activities more often than boys with Down syndrome. This finding could be explained by the nature and sex division of habitual tasks. This finding might confirm the results of the studies by Prasher, Chung, and Haque (1998) and Taylor (2008) in which males and females did not differ on the percentile rank scores of the adaptive behavior composite.

In regards to the correlation of IQ and adaptive behavior in children with Down syndrome, the present study provided some evidence. Language Development and

Responsibility were positively correlated with IQ performance while Stereotyped and Hyperactive Behavior were negatively correlated with IQ performance. In fact, people who do not adapt to their surroundings are viewed as intellectually inadequate (Lambert et al., 1993) and vice versa, their cognitive abilities strongly affect their independent living skills.

Firstly, these findings confirmed the effects of IQ on language acquisition. It might contrast with Lenneberg, Nichols, and Rosenberger's (1964) findings that there appeared to be little correlation between IQ and language level. However, nowadays, it is generally recognized that a positive relationship exists between language ability and mental ability as measured by a standard intelligence tests (Sandel & Lenore, 1998). In the case of children with Down syndrome, they tend to show cognitive delay and memory dysfunctioning which prevent them from developing their awareness, understanding the world, thinking reasonably and remember things (Buckley, 1993) so that they cannot perform well in skills on verbal tasks.

Secondly, these findings also revealed the positive effect of IQ on the skills related to taking care of their possessions, responsibly carrying out assigned tasks, being punctual, and maintaining self – control in Down syndrome children. It is reasonable enough that Down syndrome children with higher IQ were found to perform these skills better than those with lower IQ. With higher IQ, they might become more aware of the value of possessions, be able to understand and follow others' instructions and recognize the passing of time so that they can develop personal – social responsibility.

Thirdly, Down syndrome children with higher IQ do not show inappropriate physical contact and stereotypical manners as frequent as those with lower IQ. This result supported the findings that IQ performance affects restricted and repetitive behaviors. Bishop, Richler, and Lord (2006) found out that nonverbal IQ was strongly related to the prevalence of stereotyped behavior in children with autism. For the majority of such behaviors (e.g. repetitive use of objects, hand and finger mannerisms), the prevalence of restricted and repetitive behaviors was negatively associated with nonverbal IQ. However, in this present study, the finding that less hyperactive behavior was found in Down syndrome children with higher IQ was not supported by recent Yale Researchers' study which demonstrated that "High IQ is no help for those with ADHD" (Brown, Reichel, & Quinlan, 2009). That study rejected the common wisdom used to be that Attention Deficit/Hyperactivity Disorder (ADHD) has significant deficits in memory processing and cognitive skills. It revealed that an IQ of 120 or above offers no protection against ADD/ADHD. In fact, ADHD occurs in low-IQ, average-IQ and high-IQ children and adolescents (de Zeeuw, Schnack, van Belle, Weusten, van Dijk, Langen, Brouwer, van Engeland & Durston, 2012). This finding of the present study, therefore, might support the ideas that IQ is important in ADHD, as ADHD treatment response and outcome is reduced in those with lower IQ (de Zeeuw et al, 2012). In other words, psychological, psychosocial, and educational interventions for deprived children with high IQ might show to have more positive effects on behavior and overall adjustment.

In conclusion, though not much strong evidence was found to demonstrate the effects of age, gender and IQ on adaptive behavior in children with Down syndrome, the present study has contributed to provide some significant information for the building up of more effective individual education plans which are based on the understanding of the age – related changes or gender and IQ impacts.

Some limitations to this present study must be noted. First, our measure of adaptive behavior, the ABS-S:2, is a parent report measure, based on generally observed behavior rather than explicitly elicited and scaffolded behavior. Second, these findings are based on a rather small sample size. Findings need to be replicated with a larger sample size. Moreover, to have a close look on adaptive behavior in children with Down

syndrome, more effecting factors should be focused such as residential placement, institutionalization and children background (age and educational level of parents, family economy status).

References

Adams, D., Oliver, C. (2010). The relationship between acquired impairments of executive function and behavior change in adults with Down syndrome. *Journal of Intellectual Disability Research* vol. 54 issue 5 May 2010. p. 393-405

American Association of Intellectual and Developmental Disabilities. *AAIDD definitions.* Retrieved August 1, 2008 from: www.aamr.org/Policies/faq_intellectual_disability.shtml American Association of Intellectual and Developmental Disabilities. *AAIDD definitions.* Retrieved from: http://www.aaidd.org/content_106.cfm September 20, 2012

American Association on Mental Retardation. (1992). *Definitions, classifications, and systems of supports* (9th ed.). Washington, DC: Author.

Bishop, S.L., Richler, J. & Lord, C.(2006). Association between restricted and repetitive behavior and nonverbal IQ in children with autism spectrum disorders. *Child Neuropsychology*, *12,* (4-5), 247-67.

Brigstocke, S., Hulme, C., Nye, J. (2006). Number and arithmetic skills in children with Down syndrome. *Advance Online Publication: Down syndrome Research and Practice*. Retrieved from www.down-syndrome.org/research.Oct, 20th 2012

Brown, T. E., Reichel, P. C., & Quinlan, D. M. (2006). Executive function impairments in high IQ adults with ADHD. *Journal of Attention Disorders Online*, doi: 10.1177/ 1087054708326113

Buckley, S.J. (1993). Language development in children with Down syndrome - Reasons for optimism. *Down syndrome Research and Practice*, *1*(1); 3-9. doi:10.3104/reviews.5.

Buckley, S. J. (2000). Speech, language and communication for individuals with Down syndrome An overview. *Down syndrome Issues and Information*. Retrieved from http://www.down-syndrome.org/information/language/overview. October 31, 2012.

Buckley S. J., Bird, G., & Sacks, B. (2002). Social development for individuals with Down syndrome - An overview. *Down syndrome Issues and Information*. Retrieved from http://www.down-syndrome.org/information/social/overview. October 31, 2012

Caycho, L., Gunn. P., Siegal, M. (1991). Counting by Children with Down syndrome. *American Journal of Mental Retardation, 95*(5), 575-583.

Collacott, R.A. (1992). The effect of age and residential placement on adaptive behavior of adults with Down's Syndrome. *British Journal of Psychiatry*, *161*, 675 – 679.

De Zeeuw, P., Schnack, H., van Belle, J., Weusten, J., van Dijk, S., Langen, M., Brouwer, R., van Engeland, H., & Durston, S. (2012). Differential brain development with low and high IQ in Attention-Deficit/Hyperactivity Disorder. *PLoS ONE, 7* (4), doi: 10.1371/journal.pone.0035770

Dykens, E.M., Hodapp, R.M., & Evans, D.W. (2006). Profiles and development of adaptive behavior in children with Down syndrome. *Down syndrome Research and Practice*, *9*(3), 45-50.

Fidler, D.J., Hepburn, S., & Rogers, S.(2006). Early learning and adaptive behavior in toddlers with Down syndrome: Evidence for an emerging behavioral phenotype? *Down syndrome Research and Practice*, *9*(3), 37-44.

Goodenough, F. (1926). *Measurement of intelligence by drawings*. New York: World Book Co. Harrison, P. L., & Oakland, T. (2000). Adaptive Behavior Assessment System. San Antonio, TX: The Psychological Corporation.

Harrison, P. L., & Oakland, T. (2003). Adaptive Behavior Assessment System (2nd ed.). Minneapolis, MN: Pearson Assessment.

Irwin, K. (1989). The school achievement of children with Down's syndrome. *New Zealand Medical Journal, 102*, 11-13.

Lambert, N., Nihira, K., & Leland, H. (1993). *Adaptive Behavior Scale School, 2nd edition: Examiner's manual*. American Association on Mental Retardation.

Lenneberg, E. H. (1967). *Biological foundations of language.* New York: Wiley.

Määttä, T. (2011). *Down syndrome, health and disability: A population – based case record and follow – up study*. Academic dissertation. University of Oulu, Oulu.

Määttä, T., Tervo-Määttä, T., Taanila. A., Kaski, M., & Iivanainen, M . (2006). Mental health, behavior and intellectual abilities of people with Down syndrome. *Down syndrome Research and Practice*, *11*(1),37-43.

Mash, E.J., & Barkley, R. A. (2002). *Child psychopathology, second edition*: The Guilford Press.
Miller, J.F. (1992). Lexical development in young children with Down syndrome. In R. Chapman (Ed.), *Processes of Language Acquisition and Language Disorders*, 202-216. St. Louis, Moby Press.

Ornoy, A., Rihtman, T., & Parush, S. (2011) Adaptive and behavioral development in children with Down syndrome at school age with special emphasis on attention deficit hyperactivity disorder (ADHD). *Israel Prenatal Diagnosis and Screening for Down syndrome*, *14*, 19 -32

Paskiewicz, L. T. (2009). *A comparison of adaptive behavior skills and IQ in three populations: children with learning disabilities, mental retardation, and autism*. Ph.D Dissertation. Proquest LLC.

Porter, J. (1999). Learning to count; a difficult task. *Down syndrome Research and Practice., 6*(2), 85-94.

Prasher, V.P., Chung, M.C. & Haque, M.S. (1998). Longitudinal changes in adaptive behavior in adults with Down syndrome: Interim findings from a longitudinal study. *American Journal Mental Deficits*, *103*(1), 40-6.

Rihtman, T., Tekuzener, E., Parush, S., Tenebaum, A., Bachrach, S.J. & Ornoy, A. (2010). Are the cognitive functions of children with Down syndrome related to their participation? *Developmental Medicine & Child Neurology*, *52* (1), 72 – 78.

Sandel, L.S., & Lenore, H. (1998). The relationship between language and intelligence: Review of historical research. Summary #5. *Cognitive Journal*, *4,* 512 – 517.

Schatz, J., & Hamdan-Allen, J. (1995). Effects of age and IQ on adaptive behavior domains for Children with Autism. *Journal of Autism and Developmental Disorders*, *25*, (1), 51- 59.

Sigman, M., & Ruskin, E. (1999). Continuity and change in the social competence of children with autism, Down syndrome, and developmental delays. *Monographs of the Society for Research in Child Development*, *114*, 64

Silverstein, A.B., Herbs, D., Nasuta, R., & White, J.F. (1986). Effect of age on the adaptive behavior of institutionalized individuals with Down syndrome. *American Journal Mental Deficits, 90*(6), 659-62.

Sloper. P., Cunningham, C.C., Turner, S., Knussen, C. (1990). Factors related to the academic attainments of children with Down's syndrome. *British Journal of Educational Psychology*, *60*, 284-298.

Sparrow, S., Cicchetti, D., & Balla, D. (2005). Vineland Adaptive Behavior Scales (2nd ed.). Minneapolis, MN: Pearson Assessment.

Thorley, B.J., & Woods, V.M. (1979). Early number experiences for preschool Down's syndrome children. *Australian Journal of Early Childhealth, 4*(1), 15-20.

Turner. S., & Alborz, A. (2003) Academic attainments of children with Down's syndrome: A longitudinal study. *British Journal of Educational Psychology*, *73*, 563-583.

Tran. LT. T. (2005). *Research on Adaptive behavior of children with intellectual disability in special education classes at Hanoi*. Doctorial Thesis. Vietnamese Institute of Psychology.